

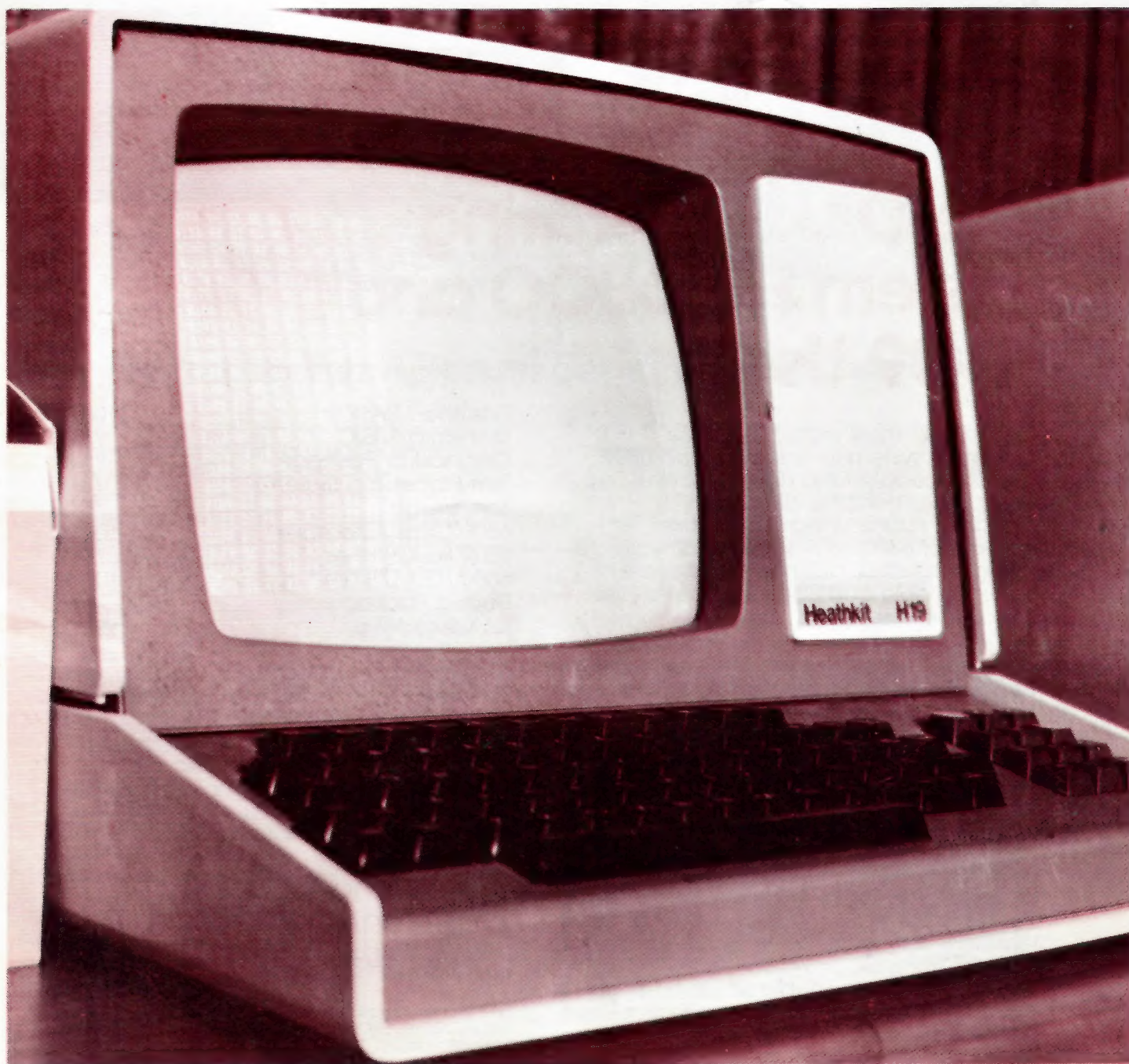
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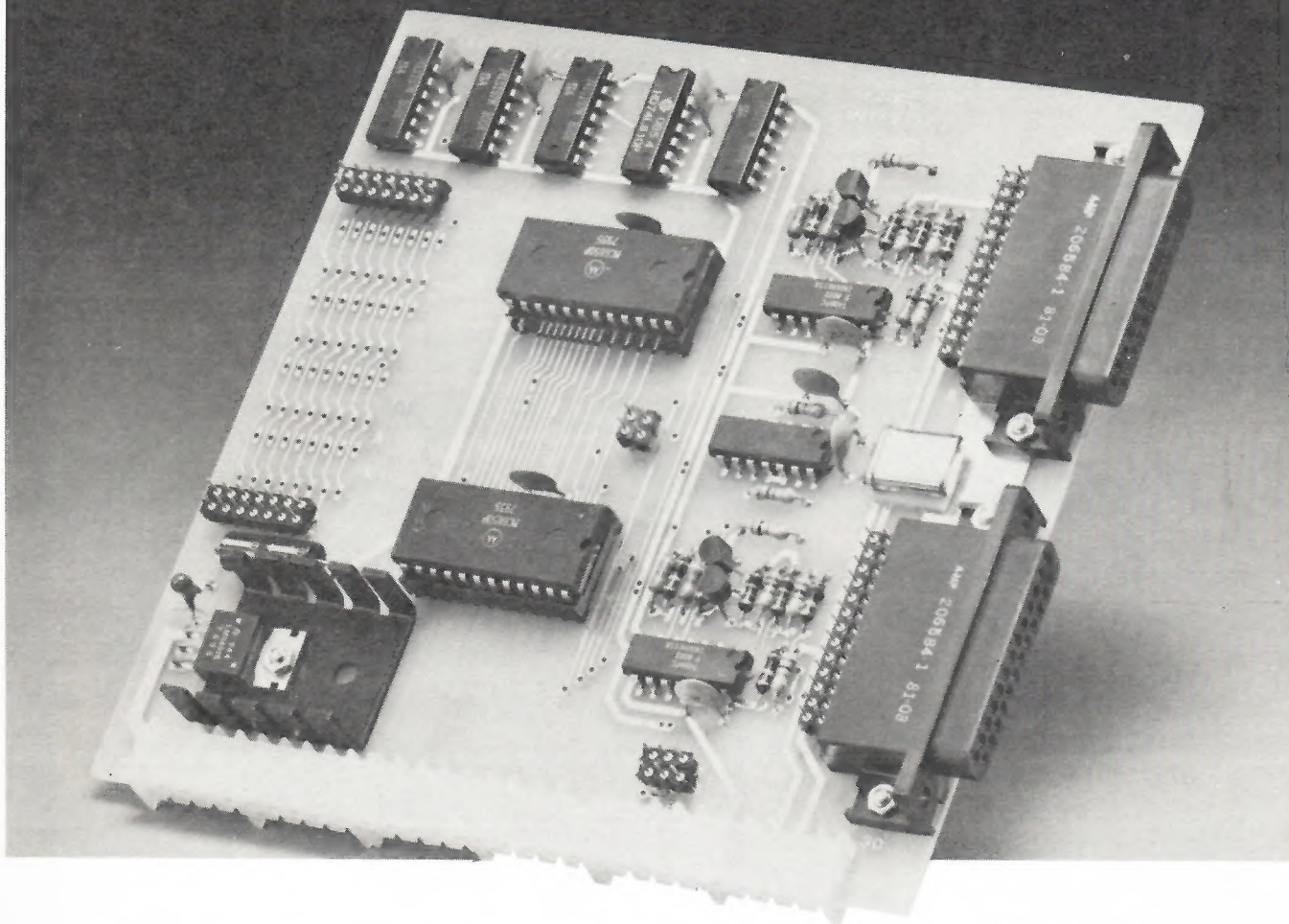


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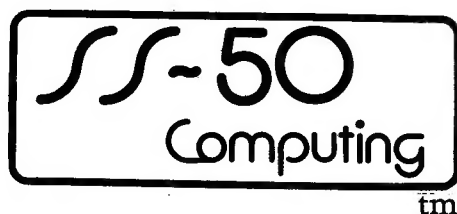
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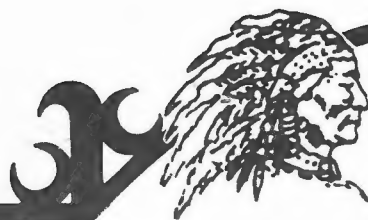
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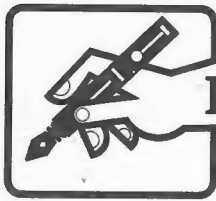
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EDITORIAL

by Ken Orme

It seems that several manufacturers besides those using the SS-50 bus have realized the potential of the 6809 microprocessor. Even though there is still a lot of talk about how it will work, Commodore Business Machines has in the works their new "Mainframe" computer, which is to allow "add-on" boards, more I/O and other such features, and uses the 6809 microprocessor. Even though some of these are not really new, I will mention them to you to help make you aware of them. Ackerman Digital Systems has a 6809 single board computer with many features designed for the S-100 bus system. Synertek Systems has the SYM-1/69 single board computer with a lot of nice features and a non-standard expansion bus. The STD bus 6809 board is available from Datricon Corp. for those using that bus. There are probably others that I overlooked, and some that I haven't heard of, but we should at least be aware of other bus systems besides the SS-50 bus.

I'm not saying that we are not on the proper bus system, just that we should know of the others. As I have stated many times, we don't have anything to take a second seat to. It may take a couple of months longer to get some of the newer software on our systems, but then we have many features, including at least three disk operating systems that literally run away from the so called "features" of the most famous S-100 DOS.

Now the Motorola 68000 microprocessor is finally being shipped in several mainframe systems. I don't think that we will ever be able to use the 68000

effectively in the SS-50 bus, due to the (small) size of the bus, compared to the size it should be to take advantage of the power of the 68000.

At least the 68000 chip from Motorola is now available in enough quantity to allow manufacturers to market their mainframe systems.

WICAT Systems is now shipping their system 100 mainframe system which incorporates all of the fine features of the 68000, including real time, multiuser, and multitasking software, up to 6Mb of memory in a standard cabinet. It runs at 8 Mhz and executes approximately one million instructions per second.

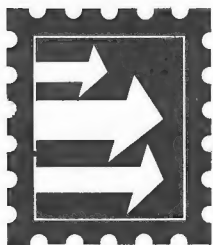
In addition, there are at least six other manufacturers building and selling the 68000 machines with more to come. As you may have guessed, none of them so far are on the SS-50 bus. However, one is on the S-64 bus, which is actually an SS-50 bus with an extra 14 bus lines. This system is designed and built by Hazelwood Computer Systems, and probably should have been worked out a long time ago (at least when the 6809 arrived!). The advantage of this system is that it will allow all regular SS-50 boards to be interchanged on the bus. The extra 14 bus lines are off to one side of the 50 bus lines, allowing compatibility by placing the old boards toward the other side. My feeling is still that no one will do justice to the 68000 without adding the extra lines as this system has done. The 50 pin bus just is not enough to allow any more signals than we now use. Even though there are others who say that they

will support the 68000 on the standard SS-50 bus, I don't know how they will do it. I have eaten my words before, but until someone does it, the average hobbyist will not be able to support it.

As you can see, beginning with this issue we have changed to the more standard 8 1/4 x 11 format. This should help increase the amount of information available per issue, plus allow standard size advertising without the extra time and expense of reducing an ad. I hope that you like the change, and that it will help improve the magazine.

The date on your mailing label is your expiration date, which means you will receive the magazine the month it expires, but not the one after. The only exception is for those who had expiration dates between 4/81 and 10/81. These were caught in the cover date change and as I told you in the editorial, we will take care of the expiration date without changing the label. I even had one subscriber write to tell me that they had expired! It seems that someone didn't read the editorial. Anyway, if there is someone out there who didn't get their July/Aug issue due to late renewal, let us know. We would like to keep you current and let you get all the issues. We have sent notices to everyone at least a month prior to (actual) expiration.

For those of you who are still confused, everything after this issue will be the correct expiration date and all should be back to normal.



LETTERS

Dear Editor,

In the Nov.-Dec. 1980 issue you published half of a program called DDISEM. You said, "for lack of space, we will have to include only the source listing in this issue, and the disassembler look-up table will be in the next one."

Well, where is it?? I'd like to finish keying in the program, and start running it.

J. Preston Brashear, III

Well, at least we didn't publish the same article twice!! Seriously, it was an oversight and we're glad to have readers keep us informed. As you will notice, the rest of the article is in this issue. I hope with the new format that the length of the software will not be as much of a problem.

Editor

I received my PERCOM LFD 800 system and upon installing the card in my ancient SWTPC 6800, found the wrong ROM had been sent. While waiting for the correct ROM I received my Exatron Stringy Floppy back (after 7 months) completely rebuilt and it works flawlessly- but the ROM's for both systems are at C000; alas, what am I to do?

I have to run with the cover on my SWTPC because of stray RF and I don't want to be forever swapping cards. I also do not find it practical to re-burn the ROM's.

My solution is very simple and might be of interest to your other readers. I ran address line A15 on each card through a 5 volt miniature reed relay (insulated and glued to the back of each card with RTV) to either the address bus (enable) or to ground (disable).

I wired the N.O and N.C. contacts in opposite ways on each of the cards and the coils in parallel. The dropping resistor drops my 7.5 volts to the coil pull-in voltage and the diode keeps switching transients of the relay coils out of the rest of my system.

Earle S. Pittman
2269 Mariposa Ave.
Boulder, Colorado 80302

Here are a few comments received on the subscription forms that will let you see why we publish what we do, and also to show what others would like to see published.

Dear Editor,

I like to see Hardware/software reviews - No industry surveys/trends to get those elsewhere.

David Baxter
Rochester, NY

Dear Editor,

I am interested in SS-50, disks on TRS-80C. Also other experimental boards for both. Any other information please.

Joe Hope
San Francisco, CA

Dear Editor,

Please continue to mail in envelopes to protect the magazine.

Ronald Schmars
Aurora, IL

Dear Editor,

I use the two 6800's to develop industrial control hardware, software and systems. Also used as an office tool.

Teksym Corporation
Wayzata, MN

Dear Editor,

I use the 6800/6809 at work in various devices.

Courtney Ide
Monroe, WA

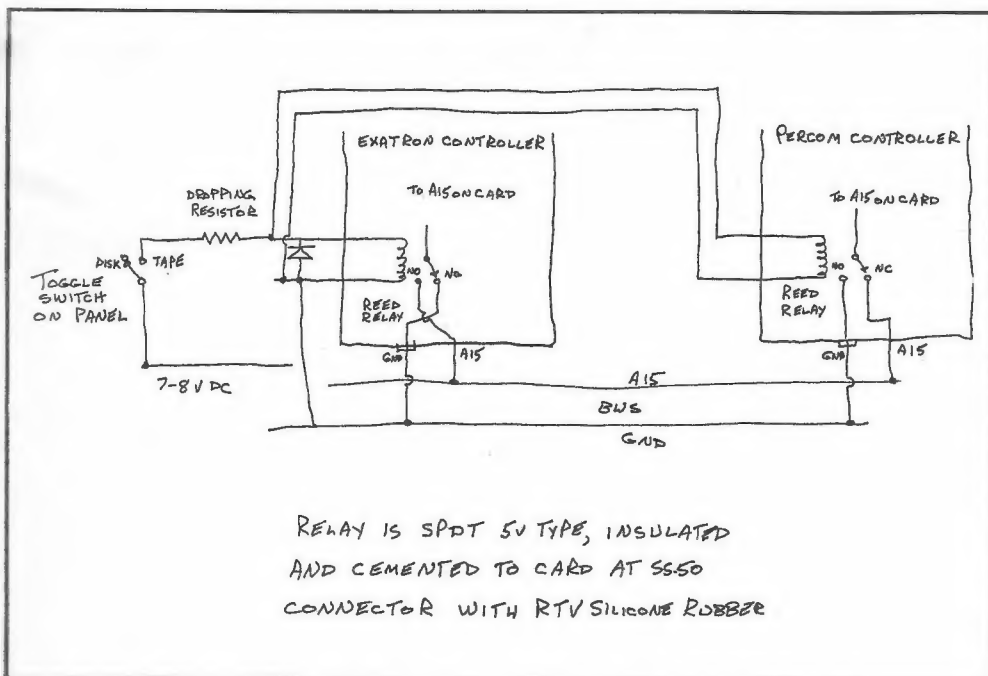
Dear Editor,

It looks like you are here to stay and I am glad. Each issue gets better.

P. Sengeil
Rome, NY

Thanks for the vote of confidence. It seems that a few unscrupulous people have tried to start rumors to the contrary. It makes us feel good to know that we threaten them that much!!

Editor



HEATH H-19A REVIEW

By Ken Orme

The H-19A terminal from Heathkit is a modern, state-of-the-art intelligent terminal. The fact that it is available in kit form, could make some people think it is in the same category as the infamous H-9 terminal. But not so! The H-19A has all the features of the more expensive terminals, yet is low-priced in kit form. For those who don't enjoy building kits, there is a wired version available for more money.

The specifications of the terminal include: Upper (5 x 7), and true-descender lower case (5 x 9) dot matrix characters; a 12 inch CRT; display format of 25 lines of 80 characters; a character set of 128 characters including 95 ASCII and 33 graphic; an 84 key keyboard plus a 12-key numeric pad; blinking underline or block cursor; relative and direct cursor addressing; edit and erase functions; auto scroll or line/page freeze; normal or reverse video; baud rates from 110 to 9600 (without flicker); and weighs in at 35.2 lbs.

The main difference between the H-19 and the H-19A is the Class B FCC certification has been given to the H-19A. One of the problems with the H-19 is that it does cause TVI, but that's not the case with the H-19A. Of course it is easy to say that something causes TVI when you may have no proof, but there is substantial proof with the older H-19 terminals. Just turn it on, (with no other computer equipment turned on) and see what your TV set looks like. B.C., (before cable) there was always the problem of at least one line of interference continually moving up the screen. If the TV and terminal were in close proximity to each other, there was also cross-hatching and other such interference. There may still be a problem caused *not* by the newer H-19A, but by the equipment to which it was connected. There is

a warning in the operations manual that specifies operation with non-certified computers is likely to result in interference to radio and TV reception.

The SS-50 Computing staff has built at least a dozen H-19's with only two serious problems occurring. Both of them were component problems and were taken care of by Heath at no charge. Because of this reliability and the excellent characteristics of this terminal, we felt that a review would be nice for those who were shopping around or thinking of up-grading. Each of the staff has an H-19 for their own personal system, and many of the readers have them as well. Also, we will cover a couple of features that you may be able to incorporate with your system.

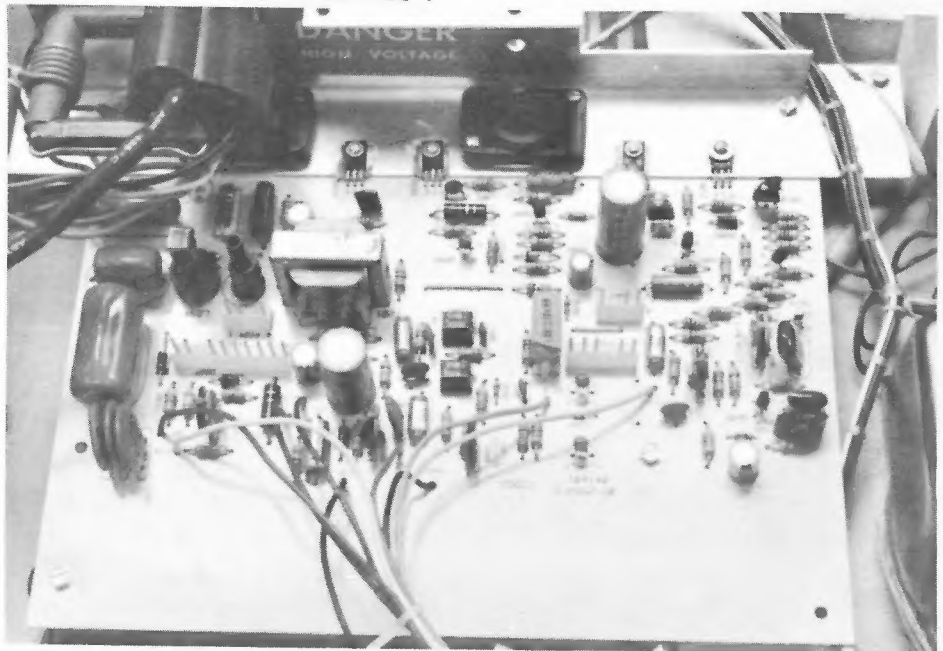
The kit arrives in two boxes. One with most of the parts in it and the other with the CRT in it. One advantage to the kit is that the largest and most complicated board comes pre-wired. Apparently there are a few things on that board that are beyond the scope of the average kit builder. There are three boards to build. The large video board, the power supply

board and a video driver board.

The cabinet is made of a new plastic material that is very strong and sturdy, yet is excellent in cosmetic appearance as well. The first thing to build is the chassis.

It is actually the cabinet base, but still requires some work. Brass inserts need to be set into the plastic so that parts may be for using screws. The very first H-19 kit required you to screw-in the inserts, but since then the soldering pencil is used to get them in place. It works very well. The locking mechanism is also mounted on the base, and it too has evolved from the very first kits. The first one required a flat object, such as a small screwdriver to lock the top of the cabinet down, and to unlock it. Now the fastener has a spring attached, so that you only need to use the screwdriver to unlock it.

The power transformer and other such parts are then mounted to the base. One of the differences noted here is the additional grounding provided by wire braid connecting the power supply parts together. It makes you wonder if all the grounding is



Video board from the H-19A kit.

Most of the time used to build the kit is spent on this

worth it, by the time you get through with the harness building. Also, the inclusion of a line filter is part of the H-19A assembly. Still another new feature is noticed at this time, and that is the brightness control pot mounted at the rear of the base on the left-hand side. These differences are mentioned to you so that if you are familiar with the H-19, at least the changes will be information that we can share.

Next, the power supply circuit board is built. It is a small board with only diodes, filter capacitors and connectors on it. It is quickly built with the superb instructions from the folks at Heathkit.

Next is the biggest board that you have to build. The video circuit board contains over 50 resistors, 30 capacitors, 11 diodes, 14 transistors, 2 IC's, and several other parts. It is a single-sided board and for those who are familiar with amateur radio, reminds one of a transistor transmitter board. It is designed for the voltages used in the video circuitry and therefore appears quite different from most of the digital boards you may be used to. It takes about two hours to complete the video board. It is attached to a heat sink for the video output transistors.

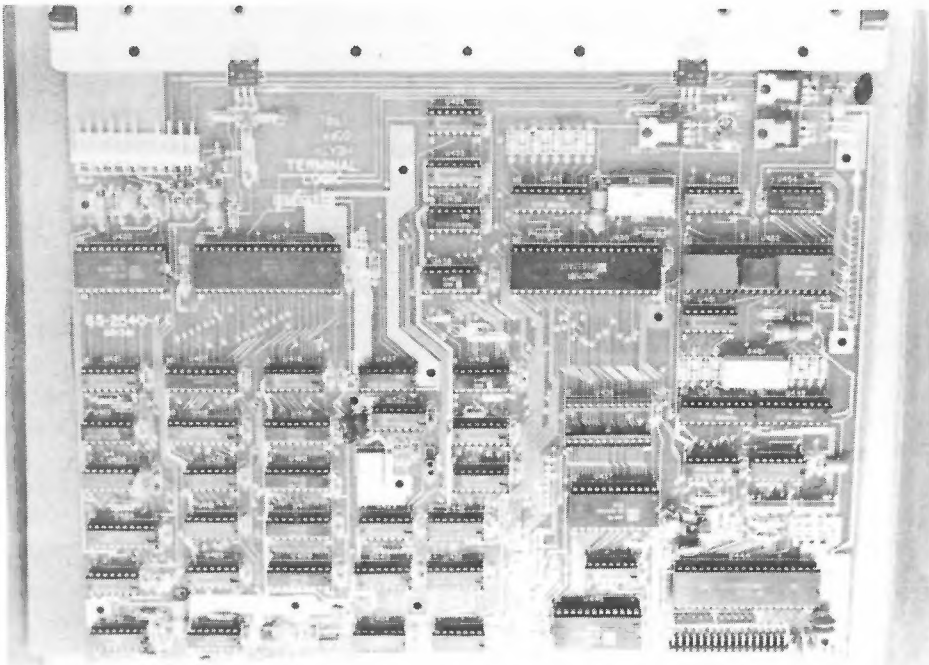
At this point, you check out the power supply and the video board by resistance checks and then applying power. There are no high voltages present, so it is safe and yet lets you know immediately if you have a mistake



The one-board power supply

on one of the two boards.

The video driver board is built next. It is again something new from the earlier H-19's. It contains the parts necessary to drive the CRT and has the CRT



This is the intelligence of the H-19A. The terminal logic board...it comes pre-wired.

socket connected to it and a connector going to the brightness control on the rear of the base. This small board is very straightforward and the instructions have you test it after building it.

Again, you need to test with an ohmmeter first, and then with a voltmeter.

The last section of building deals with the front panel and the CRT installation. This part takes the most time, and yet seems to move fast because you see the terminal take shape as you go. Some caution is required when installing the CRT, since an implosion could be quite dangerous. The instructions are very clear in this area, however, and as long as you follow them, there is no problem. The keyboard is mainly built, but you must install a few parts and the cover.

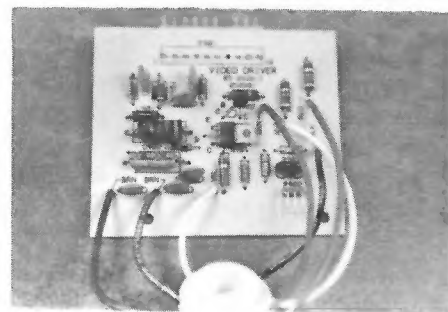
The terminal logic board is already built, as previously mentioned, so all you have to do is install it. One new part of the H-19A is the addition of a metal shield under the board and a small one near the center on top of the board. Once this is installed, the terminal is completely built.

The CRT adjustments are next. As with any newly built video equipment, you will need to line-up and adjust the display for the best appearance. The manual

gives very detailed step-by-step instructions for this operation.

The final assembly is just the mounting of the hinges and other parts for the cabinet top. It takes only a few minutes. When finished with this, the terminal is completed and ready to connect to your computer.

One thing that is noticed immediately in a side-to-side comparison is the label on the front panel. The older blue, gold,

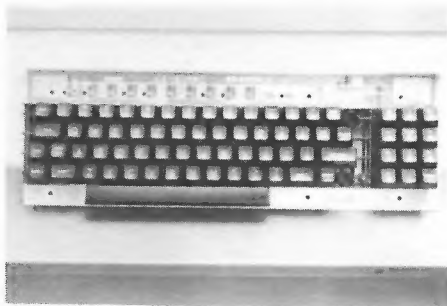


The small video driver board

and orange stripe is gone and is replaced by a gold-on-black metalized tag. The H-19A says "Heathkit Terminal", whereas the H-19 says "Heathkit H-19". The new one looks better.

The first thing you should do after completing the terminal kit or upon purchasing a pre-built terminal is to connect it to your system and try it out. There are quite a few features that the H-19 and H-19A both have, and you

should familiarize yourself with them. We felt that the inclusion of a plastic coated chart of the various escape sequences and other terminal controls was a very nice gesture. There are some dip switches inside the terminal on the logic board that you may select for the initial start-up features. Such things as a quiet but sometimes useful, key-click, choice of either underline or block



cursor, wrap-around lines, and choice of baud rates are selectable. Most of these may be altered at will with the keyboard.

There are several features that we haven't described yet. One of them is the cursor position report feature. With this, the terminal may report to a BASIC program where the cursor is positioned. Also, to compliment this feature, there is a save-the-cursor position function and a get-to-previously-saved position function which are very useful. Along with this, the direct cursor addressing features allow you to use the terminal for programs which will update the screen quickly without having to write the whole thing.

The terminal is capable of repording as a DEC corporation VT52 terminal, and in many cases is being used to replace the VT52. We have seen it used on a VAX system and most users like the H-19 better than the VT52.

There is a 25th line on the terminal that may be displayed and will not scroll along with the other lines. By using some ingenuity, you could have this line be a prompt for certain controls used throughout a program, or display a message for a certain length of time before erasing. By the way, this 25th line may be

transmitted if desired. The other 24 lines are transmitted separately.

The graphics characters were mentioned in the list of specifications, but you should be aware that they are useful even in some programs. As an example, there is one graphics character that is the divide sign that most people are familiar with. That makes it possible to use it instead of the slash for math tutoring, etc. Most of the graphics characters fit in the category of those found on the Commodore PET, although there are differences.

Performance wise, the H-19 is excellent, and you must use one to appreciate it. It really beats the socks off from many of the terminals that claim to be "intelligent". You won't go wrong by purchasing or building an H-19A.

Now for some of the extras that we promised. If you only have a tape system, and would like to at least get one disk, by using the H-19 as the cabinet and power supply, all you need is a drive and a disk controller board. You should, however, "do it right" and purchase the bracket and shield from Heath. Without the shield, there is a danger of disks being erased by the magnetic field around the CRT. At least the chance of some missing bytes. The bracket isn't as important if you are willing to make one yourself. One of the staff bought the required parts to mount a disk in the unit and it cost about \$28 or so for them. So far, (one year later) there has been no problem with using the required voltages for the disk from the terminal power supply. Everything seems to run as it is intended to do.

There is probably a bit more heat generated from the terminal with the disk drive inside the cabinet.

Another feature that you may not know about is the reset control on the terminal is also available (with an extra wire) to run to the reset on your computer. This makes it handy when remote resetting is needed or when it would be useful for a particular application. Since the terminal

sends the signal through an open collector transistor, there should be no problems encountered with most applications.

Finally, there is the scrolling feature on the H-19 terminal. With the Heath computer system, you may scroll a screen at a time, or a line at a time through the use of the scroll key. Since we are using different software, there will be some changes necessary to your present software in order to use it. The standard stop option used in FLEX 2.0 is an escape which is required if the pause feature is enabled, (TTYSET,PS=Y), and is always activated if a pause during printouts is desired by typing 'esc'. In the DEC series of computers and many other now starting to show up on the market the 'DC1-DC3' start and stop controls are more common. The Heath H-19 terminals are equipped to automatically send a DC1 and DC3 to indicate a buffer full in the terminal. This feature along with a scroll function that may be enabled at the terminal needs the computer to respond to DC1 and DC3. In FLEX this is not too hard. The location to stop the print is at \$AEBF, (this is a word pointing to the ESC character) and the start print is at \$AF8C. To change these to the DC1 and DC3 change the following:

\$AEBE 81 13

\$AEC0 01

\$AF8B 81 11

\$AF8D 01

This will toggle the print off by a control 'S' and back on by a control 'Q' since the screen can "hang". If you forgot about being in holdscreen mode, hit the scroll button and get the next line.

While the added shielding in the H-19A make the kit a bit longer to construct, the building time remains near 9 or 10 hours, depending on the individual. It's too bad that the extra time, money and effort had to go into the shielding. Since construction, the three H-19A kits that I built have all performed flawlessly. The features and performance of the H-19 and H-19A make them one of the best buys in terminals today.

[SS-50]

MODEM

Software For Those With a Modem

By Gene Embry
Route 1 Box 151-H
Morrisville, NC 27560

Editor's Note:

This program is published without the usual trial/testing so that others that enjoy trying a program out and finding good and bad [bugs] with it may do so. Mr. Embry would appreciate comments from those of you wishing to do so.

Sending a data file from a disk via a modem can be accomplished using the program XMIT.TXT. If the receiving system is running RCVER.TXT then the contents of the data file will end up in the receiver's memory.

The assumptions behind the development are as follows: A Smoke Signal disk operating system is used. Only stored data files will be transmitted. Thus, conversational (talk) mode is not permitted. XMIT starts by sending a hex \$03 (STX), start of string. It does not expect an echo. Each subsequent character sent will be displayed on the video and wait about half of a second for an echo. If none is received, the program terminates. If the wrong character is received the program terminates. When a carriage return (OD) is sent, we insert a line feed (\$0A). Initially, I considered only sending BASIC data files and needed to insert the

line feed for the video. I really don't know the proper way to handle this situation.

The routine MSCNT may need to be changed if your CPU is running at 1 Mhz. Line 185 of the source code should be changed.

The program RCVER.TXT, is a bit more general in use than XMIT.TXT. It will allow you time to get your accoustical coupler attached and wait for an input from your control port. See lines 76 to 80. We then wait for an STX (\$03) to unlock the program. The program continues by reading a character at a time, returning the echo, storing the character in memory and displaying the data file on the CRT.

The program will terminate if a character is not received each second or so. This is handled in the routine INCHAR by calling the DELAY routine up to 10 times. The values of TVALUE and Accumulator B may need to be adjusted to fit your CPU clock.

Both programs are stored as transient commands. Initial testing was done using my printer that is connected via an ACIA. Actually, on line-testing has yet to be done.

Any comments would be greatly appreciated.


```

1:          NAM    XMIT.TXT
2: *
3: *  DOS68 System programming equates
4: *
C000 5: SYSBAS EQU    $C000          Base address for this system
6: *
C880 7: DOSFCB EQU    SYSBAS+$0880 DOS FCB address
CD80 8: TCA      EQU    SYSBAS+$0D80 Ors of transient command area
D280 9: DOSJMP EQU    SYSBAS+$1280 DOS Jump table
D780 10: DFMORG EQU    SYSBAS+$1780 Base addr of DFM
11: *
12: * Parameter table definition
13: *
14: * Monitor linknames
15: *
D283 16: ZWARMS EQU    DOSJMP+$03  Monitor warm start
D291 17: ZFLSPC EQU    DOSJMP+$11  Get a file specification
D29D 18: ZDIE  EQU    DOSJMP+$1D  Die, print cmd string and error
D2A6 19: ZOUTST EQU    DOSJMP+$28  Output string at X (end at EOS)
D2BE 20: ZOUTCH EQU    DOSJMP+$3E  User alterable output

```

```

1:          NAM    RCVER.TXT
2: *
3: *  SSB--DOS68 System programming equates
4: *  This program will use the SSB equates.
5: *
C000 6: SYSBAS EQU    $C000          Base address for this system
7: *
CD80 8: TCA      EQU    SYSBAS+$0D80 Ors of transient command area
D280 9: DOSJMP EQU    SYSBAS+$1280 DOS Jump table
D300 10: PARTBL EQU    SYSBAS+$1300 Parameter table
11: *
12: * Monitor linknames
13: *
D283 14: ZWARMS EQU    DOSJMP+$03  Monitor warm start
D2A6 15: ZOUTST EQU    DOSJMP+$28  Output string at X (end at EOS)
D2AF 16: ZOUTHA EQU    DOSJMP+$2F  Print an address in hex
D2C1 17: ZPUTCH EQU    DOSJMP+$41  Directed output vector
D2C4 18: ZGETCH EQU    DOSJMP+$44  directed input vector
D2DC 19: ZCRLF EQU    DOSJMP+$5C  Print cr/lf string
20: *

```

```

D2C1 21: ZPUTCH EGU DOSJMP+41 Directed output vector
D2DC 22: ZCRLF EGU DOSJMP+5C Print cr/lf string
23: *
24: * DFM linkages
25: *
D788 26: DFM EGU DFMORG+6 I/O Request entry
27: *
28: * File control block (FCB) indices
29: *
0000 30: XFC EGU 0 DFM Function code
0001 31: XES EGU 1 Error status
32: *
33: * DFM function codes (XFC)
34: *
0004 35: BS04R EGU 4 Open for read
0005 36: BSREAD EGU 5 Read
0008 37: BSRC EGU 6 Close after read
38: *
39: * DFM error codes (XES)
40: *
0008 41: EEOF EGU 6 End-of-file
42: *
43: * Print codes
44: *
0000 45: EOS EGU $00 End of string
0003 46: STX EGU $03 Start of text
0007 47: BELL EGU $07 Dims-a-line
000A 48: LF EGU $0A Line feed
000D 49: CR EGU $0D Carriage return
50: *
51: * Format: XMIT.<file specification>
52: *
53: * This will transmit via a modem on port #0
54: * the contents of the data file specified.
55: * Echo from receiver modem required for each
56: * transmitted character.
57: *
58: * Disk location: MODEM
59: *
60: * Program equates
61: *
B000 62: MODEMS EGU $B000 Status
B001 63: MODEMD EGU MODEMS+1 Data
01F4 64: HALF EGU 500 # of msec in 0.5 seconds
01AC 65: SIZE EGU FINAL-START Size of this program
04FF 66: MAXSIZ EGU DOSJMP-TCA-1 Max. size of TCA
67: *
CDB0 68: ORG TCA
69: *
CDB0 20 03 70: START BRA XMIT
CDB2 71: TIME RMB 2
CDB4 72: ERCODE RMB 1
73: *
CDB5 74: XMIT EGU *
75: *
CDB5 BD D2DC 76: JSR ZCRLF CR & LF to screen
CDB8 7F CDB4 77: CLR ERCODE
CDB8 CE CE40 78: LDX #FCB
CDB8 BD D2B1 79: JSR ZFLSPC Get disk # and name
CDB1 24 08 80: BCC SPECOK Continue if ok
CDB3 CE CED8 81: LDX #ERMES1
CDB5 BD D2A8 82: JSR ZOUTST
CDB8 7E D2B8 83: JMP ZDIE
84: *
CDB8 85: SPECOK EGU *
86: *

```

```

21: * Parameter table definition
22: *
D302 23: YMEMAX EGU PARTBL+$02 User memory limit
D317 24: YCPORT EGU PARTBL+$17 Control port
25: *
26: * Codes
27: *
0000 28: EOS EGU $00 End of string
0003 29: STX EGU $03 Start of text
0007 30: BELL EGU $07 Dims-a-line
000A 31: LF EGU $0A Line feed
000D 32: CR EGU $0D Carriage return
001F 33: MIN EGU $20-1 One less than SPACE char
007F 34: MAX EGU $7F Upper limit of printable char
35: *
36: * Format: RCVER.$
37: *
38: * This will receive via a modem on port #0
39: * the contents of a data file sent by XMIT.$
40: * The data will be stored in RAM, starting at $0100.
41: * The maximum value of RAM is YMEMAX.
42: *
43: * Disk location: MODEM
44: *
45: * Program equates
46: *
B000 47: MODEMS EGU $B000 Status
B001 48: MODEMD EGU MODEMS+1 Data
5D00 49: TVALUE EGU $5D00 Value for 0.1 second delay
0128 50: SIZE EGU FINAL-START Size of this program
04FF 51: MAXSIZ EGU DOSJMP-TCA-1 Max. size of TCA
52: *
CDB0 53: ORG TCA
54: *
CDB0 20 07 55: START BRA RCVER
CDB2 56: BEGA RMB 2
D302 57: ENDA EGU YMEMAX
CDB4 58: TEMPX RMB 2
CDB8 59: TEMP RMB 1
CDB7 60: ERCODE RMB 1 Flag location for errors
CDB8 61: ERMES3 RMB 1 RAM full indicator
62: *
63: * Initialization section
64: *
CDB8 CE 0100 65: RCVER LDX #$0100
CDB8 FF CDB2 66: STX BEGA Lower limit of RAM
CDBF FF CDB4 67: STX TEMPX
68: *
69: * Now to initialize the modem a/c
70: *
CDB2 88 03 71: LDA A #$03
CDB4 87 B000 72: STA A MODEMS
CDB7 88 15 73: LDA A #$15 300 baud, 1 stop bit and no parity
CDB9 87 B000 74: STA A MODEMS
75: *
CDB8 BD D2DC 76: JSR ZCRLF CR & LF to screen
CDBF CE CE4A 77: LDX #MESS The starting message
CDA2 BD D2A8 78: JSR ZOUTST
CDA5 BD D2C4 79: JSR ZGETCH Get input from terminal
CDA8 BD D2DC 80: JSR ZCRLF
81: *
82: * We require an STX as the first char
83: *
CDA8 BD 67 84: GETSTX BSR INCHAR Get a char
CDA8 81 03 85: CMP A #STX Is this it?
CDAF 26 FA 86: BNE GETSTX No

```

```

CDB8C 86 03      87:      LDA A #STX      Unlock receiving program
CDB8E 8D 8E      88:      BSR      OUTCH
CDA0  CE CE48    89:      LDX      #FCB
CDA3  86 04      90:      LDA A #GB04R      Open for read
CDA5  A7 00      91:      STA A XFC,X
CDA7  BD D786    92:      JSR      DFM      Open the file
CDA8  26 2E      93:      BNE      PERROR
CDAC  86 05      94:      LDA A #GBREAD      Ready for read
CDAE  A7 00      95:      STA A XFC,X
CDB0      96:      *
CDB0      97: READ  EQU      *
CDB0      98:      *
CDB0  CE CE48    99:      LDX      #FCB      Get a character
CDB3  8D D786   100:      JSR      DFM      and return with it in Acc. A
CDB6  E8 01     101:      LDA B XES,X      Get error status
CDB8  26 20     102:      BNE      PERROR
CDBA  8D D2C1   103:      JSR      ZPUTCH      Print transmitted character
CDBD  8D 4F     104:      BSR      OUTCH      Put it to modem
CDBF  8D 58     105:      BSR      GECHO      Receiver must echo!
CDC1  7D CDB4   106:      TST      ERCODE
CDC4  26 14     107:      BNE      PERROR      We have an echo error
CDC6  81 0D     108:      CMP A #CR
CDC8  26 E6     109:      BNE      READ
CDCA  86 0A     110:      LDA A #LF
CDDC  8D 40     111:      BSR      OUTCH      Send to modem
CDCE  8D D2C1   112:      JSR      ZPUTCH      Print to screen
CDD1  8D 46     113:      BSR      GECHO      Get echo from receiver
CDD3  7D CDB4   114:      TST      ERCODE
CDD6  26 02     115:      BNE      PERROR
CDD8  20 D6     116:      BRA      READ
CDDA      117:      *
CDDA      118: PERROR EQU      *
CDDA      119:      *
CDDA  F6 CDB4   120:      LDA B ERCODE      Get erocode into acc B
CDDD  C1 00     121:      CMP B #0
CDDF  27 11     122:      BEQ      P2      No errors
CDE1  C1 02     123:      CMP B #2      Was wrong char. echoed
CDE3  26 08     124:      BNE      P1      if not then no echoed char
CDE5  CE CEF8   125:      LDX      #ERMES2
CDE8  8D D2A6   126: P0      JSR      ZOUTST      Print a string
CDEB  20 05     127:      BRA      P2
CDED  CE CF16   128: P1      LDX      #ERMES3
CDF0  20 F6     129:      BRA      P0
CDF2  CE CE48   130: P2      LDX      #FCB
CDF3  86 06     131:      LDA A #GBSRC      Ready to close file
CDF7  A7 00     132:      STA A XFC,X
CDF9  8D D786   133:      JSR      DFM
CDFC  CE CE48   134:      LDX      #FCB
CDFF  E8 01     135:      LDA B XES,X
CE01  C1 08     136:      CMP B #EEOF      Was it end of file?
CE03  27 06     137:      BEQ      DONE      Yes
CE05  CE CED9   138:      LDX      #ERMES1      Wrong specification
CE08  8D D2A6   139:      JSR      ZOUTST
CE08      140:      *
CE08      141: DONE  EQU      *
CE08      142:      *
CE08  7E D283   143:      JMP      ZWARMS      End of program
CE0E      144:      *
CE0E      145: OUTCH  EQU      *
CE0E      146:      *
CE0E  F6 8000   147:      LDA B MODEMS      Send char. from data file
CE11  57      148:      ASR B
CE12  57      149:      ASR B
CE13  24 F6    150:      BCC      OUTCH
CE15  87 8001   151:      STA A MODEMD
CE18  38      152:      RTS
CE18      153:      *

```

```

B7:      *
B8:      * Clear error code locations
B9:      *
CDB1  7F CDB7   90:      CLR      ERCODE
CDB4  7F CDB8   91:      CLR      ERMES3
CDB7  8D 58     92:      *
CDB7  8D 58     93:      * Get character from modem
CDB7  8D 58     94:      *
CDB7  8D 58     95: GET      BSR      INCHAR      Get char from modem
CDB9  7D CDB7   96:      TST      ERCODE
CDBC  26 38     97:      BNE      LAST      Nothing received
CDBC  26 38     98:      *
CDBC  26 38     99:      * Echo it to sending unit
CDBE  CE 8000   100:      *
CDBE  CE 8000   101:      LDX      #MODEMS
CDBE  CE 8000   102:      BSR      OUTCHR
CDC1  8D 74     103:      *
CDC3      104: RAMIT  EQU      *
CDC3      105:      *
CDC3      106:      * Save the receiver char in RAM, maybe
CDC3      107:      *
CDC3  FE CDB4   108:      LDX      TEMPX
CDC6  8C D302   109:      CPX      ENDA      Have we filled up RAM?
CDC8  27 08     110:      BEQ      ERAM      Yes we have
CDCB  A7 00     111:      STA A 0,X      Save the char
CDDC  08      112:      INX
CDCE  FF CDB4   113:      STX      TEMPX
CDD1  20 0E     114:      BRA      VIDEO
CDD3      115:      *
CDD3      116: ERAM    EQU      *
CDD3      117:      *
CDD3      118:      * If data input exceeds memory then
CDD3      119:      * data is not stored in RAM but it
CDD3      120:      * will be printed on video.
CDD3      121:      *
CDD3  F6 CDB8   122:      LDA B ERMES3      Has this message been printed?
CDD8  26 08     123:      BNE      VIDEO      Yes
CDD8  CE CEE8   124:      LDX      #MESS3      Get RAM full message
CDD8  8D D2A6   125:      JSR      ZOUTST
CDD8  8D D2A6   126:      COM      ERMES3      Set
CDE1      127:      *
CDE1      128: VIDEO  EQU      *
CDE1      129:      *
CDE1      130:      * Test to see if char. is printable
CDE1      131:      *
CDE1  81 0A     132:      CMP A #LF      We'll print CR & LF to
CDE3  27 0C     133:      BEQ      PRINT      the video but no other
CDE5  81 0D     134:      CMP A #CR      non-printing characters.
CDE7  27 08     135:      BEQ      PRINT
CDE9  81 1F     136:      CMP A #MIN      Less than a "space"?
CDEB  2F 07     137:      BLE      V1      Yes - don't print it
CDED  81 7F     138:      CMP A #MAX      Greater than $7F?
CDEF  2E 03     139:      BGT      V1      Yes-don't print
CDF1  8D D2C1   140: PRINT   JSR      ZPUTCH      Print to video
CDF4  20 C1     141: V1      BRA      GET      Continue receiving data
CDF4  20 C1     142:      *
CDF4  20 C1     143:      * Ending section is called when chars are no longer sent.
CDF4  20 C1     144:      *
CDF6  CE CE72   145: LAST   LDX      #MESS1      'From'
CDF8  8D D2A6   146:      JSR      ZOUTST
CDFC  CE CDB2   147:      LDX      #BEGA      Always $0100
CDFF  8D D2AF   148:      JSR      ZOUTH      Print address
CE02  CE CDB4   149:      LDX      #MESS2      -to-
CE05  8D D2A6   150:      JSR      ZOUTST
CE08  7A CDB5   151:      DEC      TEMPX+1      Back up one
CE0B  CE CDB4   152:      LDX      #TEMPX      Last used location for storage
CE0E  8D D2AF   153:      JSR      ZOUTH
CE11      154:      *
CE11      155:      * Back to DOS
CE11      156:      *
CE11  7E D283   157:      JMP      ZWARMS
CE11      158:      *

```



```

CE18      154: GECHO EQU *
155: *
156: *      This routine will wait for at least a half
157: * second for an echo. If none is received
158: * then ERCODE is set to 3.
159: * If wrong char. echoed then ERCODE set to 2.
160: *
CE18 CE 01F4      161:      LDX #HALF      500msec = .5 seconds
CE1C FF CD82      162:      STX TIME
CE1F 8D 21      163: E1      BSR MSCNT      1 msec delay
CE21 FE CD82      164:      LDX TIME
CE24 08      165:      DEX      Is it 0.5 seconds yet?
CE25 27 17      166:      BEQ SETFLG      Yes
CE27 FF CD82      167:      STX TIME
CE2A F6 8000      168:      LDA B MODEMS      Get status
CE2D 54      169:      LSR B      Echo received?
CE2E 24 EF      170:      BCC E1      No
CE30 F6 8001      171:      LDA B MODEMD      Yes-set it
CE33 11      172:      CBA      Compare A to B
CE34 C6 00      173:      LDA B #0
CE36 24 02      174:      BCC ERTS      A=B
CE38 C6 02      175:      LDA B #02      Error code for A <> B
CE3A F7 CD84      176: ERTS      STA B ERCODE      may be 0, 2 or 3
CE3D 39      177:      RTS
CE3E C6 03      178: SETFLG LDA B #03      Error code for no echo
CE40 20 F8      179:      BRA ERTS

CE42      180: *
181: MSCNT EQU *
182: *
183: * 1 millisecond delay
184: *
CE42 CE 011B      185:      LDX #283      For 1.8 Mhz cpu
CE45 08      186: M1      DEX
CE46 26 FD      187:      BNE M1
CE48 39      188:      RTS
189: *
CE48      190: FCB RMB 144
191: *
192: ERMES1 FCB CR,LF
193:      FCC /Illegal file specification/

CED8 0D
CEDA 0A
CEDB 48      194:      FCC /Illegal file specification/
CEDC 8C 8C
CEDE 85 87
CEE0 61 8C
CEE2 20 88
CEE4 89 8C
CEE6 85 20
CEE8 73 70
CEEA 85 83
CEEC 88 88
CEEE 88 83
CEFO 81 74
CEF2 89 8F
CEF4 8E
CEF5 0D      194:      FCB CR,LF,EOS
CEF6 0A 00      195: *

CEFB 07      196: ERMES2 FCB BELL,CR,LF
CEFD 0D 0A
CEFE 57      197:      FCC /Wrong character 'echoed'/
CEFC 72 8F
CEFE 8E 87
CF00 20 83
CF02 88 81
CF04 72 81
CF06 83 74
CF08 85 72

```

```

CE14      198: INCHAR EQU *
199: *
200: * This routine will wait about one second for
201: * a character. If nothing is received then
202: * ERCODE will be set to '2'.
203: *
CE14 C8 0A      204:      LDA B #10      Number of times to call DELAY
CE16 F7 CD88      205:      STA B TEMP
CE18 B8 8000      206: IN1      LDA A MODEMS      Do we have a character?
CE1C 47      207:      ASR A
CE1D 25 0E      208:      BCS IN2      Ready to read
CE1F C8 01      209:      LDA B #01      Time for delay is 0.1 seconds
CE21 8D 1D      210:      BSR DELAY
CE23 7A CD88      211:      DEC TEMP
CE26 7D CD88      212:      TST TEMP      Has DELAY been called ten times?
CE28 27 08      213:      BEQ SETFLG      Yes it has.
CE2B 20 EC      214:      BRA IN1      Try again
CE2D B8 8001      215: IN2      LDA A MODEMD      Got a character
CE30 39      216:      RTS
CE31 C6 02      217: SETFLG LDA B #2      Error code for 'no char received'
CE33 F7 CD87      218:      STA B ERCODE
CE36 39      219:      RTS
220: *
221: *
222: OUTCHR EQU *
223: *
224: * Output via ACIA as pointed to by X.
225: *
CE37 EB 00      226:      LDA B 0,X      Ready to send?
CE38 57      227:      ASR B
CE3A 57      228:      ASR B
CE3B 24 FA      229:      BCC OUTCHR      No
CE3D A7 01      230:      STA A 1,X
CE3F 39      231:      RTS
232: *
233: *
234: DELAY EQU *
235: *
236: * Delay will wait for 0.1 sec times value in Acc. B
237: *
CE40 CE 5D00      238:      LDX #TVALUE      For 0.1 seconds
CE43 09      239: DEL1      DEX      This line and next line
CE44 26 FD      240:      BNE DEL1      take about 0.1 seconds.
CE46 5A      241:      DEC B
CE47 26 F7      242:      BNE DELAY      Wait another 0.1 seconds
CE48 39      243:      RTS
244: *
CE4A 0D      245: MESS      FCB CR,LF
CE4B 0A
CE4C 57
CE4D 88 85
CE4F 8E 20
CE51 8D 8F
CE53 84 85
CE55 8D 20
CE57 88 73
CE58 20 72
CE5B 85 81
CE5D 84 78
CE5F 20 70
CE61 72 85
CE63 73 73
CE65 20 27
CE67 72 85
CE68 74 75
CE6B 72 8E
CE6D 27 2E
CE6F 20 20
CE71 00      246:      FCB EOS
247: *
248: MESS1 FCB CR,LF,LF,LF
249: *
250: *
251: *
252: *
253: *
254: *
255: *
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New Products

MARK DATA PRODUCTS' COLOR BERSERK

Mark Data Products introduces COLOR BERSERK, a new hi-res graphics game on cassette for 16K Radio Shack Color Computers.

COLOR BERSERK closely duplicates the popular arcade game with dynamite sound effects and super joy stick action. The exciting combination of angry robots and Evil Orville will provide many hours of constant challenge in this one or two player game. COLOR BERSERK is a winning addition to the popular Mark Data Products adventure game series.

Available postpaid, for just \$24.95 directly from Mark Data Products, 23802 Barquilla, Mission Viejo, California, (714) 768-1551.

PERCOM MOVE SCHEDULED FOR SEPTEMBER

Lucy Mauch, general manager of PERCOM Data Company, announced here today that the company will be moving into new quarters in nearby Dallas in September.

This will be the third move to larger quarters for the five-year-old manufacturer of electronic devices for microcomputers.

All operations except technical services and repair, which will remain in the present site in Garland, will be housed in the new 27,000 square-foot complex.

Mauch said the additional space and an improved telephone facility will "go a long way" to ease the pressure to expand, without diminishing the customer service that has sustained PERCOM's high growth rate.

PERCOM is a major supplier of mini-disk systems and system enhancement modules for TRS-80 and System-50 computers.

The new PERCOM building, which is in the final stages of construction, is situated at 11220 Pagemill Road, Dallas, Texas 75243.

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```

CF0A 20 27
CF0C 85 83
CF0E 88 8F
CF10 85 84
CF12 27
CF13 0D      188:      FCB      CR,LF,EOS
CF14 0A 00

      199: *

CF16 07      200: ERMES3 FCB      BELL,CR,LF
CF17 0D 0A
CF18 4E      201:      FCC      /No echo received/
CF1A 8F 20
CF1C 85 83
CF1E 88 8F
CF20 20 72
CF22 85 83
CF24 85 89
CF26 76 85
CF28 84
CF29 0D      202:      FCB      CR,LF,EOS
CF2A 0A 00

      203: *

CF2C      204: FINAL  EQU      *
      205: *
CDB0      206:      END      START
      NO ERROR(S) DETECTED

```

SYMBOL TABLE:

BELL	0007	CR	000D	DFM	D786	DFMORG	D780
DONE	CE0B	DOSFCB	C880	DOSJMP	D280	E1	CE1F
EEOF	000B	EOS	0000	ERCODE	CD84	ERMES1	CE08
ERMES2	CEFB	ERMES3	CF16	ERTS	CE3A	FCB	CE48
FINAL	CF2C	GECHO	CE18	HALF	01F4	LF	000A
HI	CE43	MAXSIZ	04FF	MODEMD	8001	MODEMS	8000
MSCNT	CE42	OUTCH	CE0E	PO	CDE8	P1	CDED
P2	CDF2	PERROR	CDDA	QSD4R	0004	QSRC	0006
QREAD	0005	READ	CDB0	SETFLG	CE3E	SIZE	01AC
SPECOK	CD8C	START	CD80	STX	0003	SYSBAS	C000
TCA	CD80	TIME	CD82	XES	0001	XFC	0000
XMIT	CD85	ZCRLF	D2DC	ZDIE	D29D	ZFLSPC	D281
ZOUTCH	D28E	ZOUTBT	D2A6	ZPUTCH	D2C1	ZWARMS	D283

```

CE78 81 20
CE7B 86 72
CE7D 8F 8D
CE7F 3A 20
CE81 20 24
CE83 00      210:      FCB      EOS
      211: *
CE84 20      212: MESS2  FCC      / to: */
CE85 20 20
CE87 74 8F
CE89 3A 20
CE8B 20 24
CE8D 00      213:      FCB      EOS
      214: *
CE8E 0D      215: MESS3  FCB      CR,LF,LF,BELL
CE8F 0A 0A
CE91 07
CE92 2A      216:      FCC      /* * Memory full * */
CE93 20 2A
CE95 20 4D
CE97 85 8D
CE99 8F 72
CE9B 79 20
CE9D 86 75
CE9F 8C 8C
CEA1 20 2A
CEA3 20 2A
CEA5 0D      217:      FCB      CR,LF,EOS
CEA6 0A 00
CEA8      218: FINAL  EQU      *
      219: *
CDB0      220:      END      START
      NO ERROR(S) DETECTED

```

SYMBOL TABLE:

BEGA	CD82	BELL	0007	CR	000D	DEL1	CE43
DELAY	CE40	DOSJMP	D280	ENDA	D302	EOS	0000
ERAM	CDD3	ERCODE	CD87	ERMES3	CD88	FINAL	CEA8
GET	CD87	GETSTX	CDAB	IN1	CE19	IN2	CE2D
INCHAR	CE14	LAST	CDF8	LF	000A	MAX	007F
MAXSIZ	04FF	MESS	CE4A	MESS1	CE72	MESS2	CE84
MESS3	CE8E	MIN	001F	MODEMD	8001	MODEMS	8000
OUTCHR	CE37	PARTBL	D300	PRINT	CDF1	RAMIT	CDC3
RCVER	CD89	SETFLG	CE31	SIZE	0128	START	CDB0
STX	0003	SYSBAS	C000	TCA	CD80	TEMP	CD86
TEMPX	CD84	TVALUE	5D00	V1	CDF4	VIDEO	CDE1
YCPORT	D317	YMEMAX	D302	ZCRLF	D2DC	ZGETCH	D2C4
ZOUTH	D2AF	ZOUTST	D2A6	ZPUTCH	D2C1	ZWARMS	D283

New Products

MARK DATA PRODUCTS' COLOR BERSERK

Mark Data Products introduces COLOR BERSERK, a new hi-res graphics game on cassette for 16K Radio Shack Color Computers.

COLOR BERSERK closely duplicates the popular arcade game with dynamite sound effects and super joy stick action. The exciting combination of angry robots and Evil Orville will provide many hours of constant challenge in this one or two player game. COLOR BERSERK is a winning addition to the popular Mark Data Products adventure game series.

Available postpaid, for just \$24.95 directly from Mark Data Products, 23802 Barquilla, Mission Viejo, California, (714) 768-1551.

PERCOM MOVE SCHEDULED FOR SEPTEMBER

Lucy Mauch, general manager of PERCOM Data Company, announced here today that the company will be moving into new quarters in nearby Dallas in September.

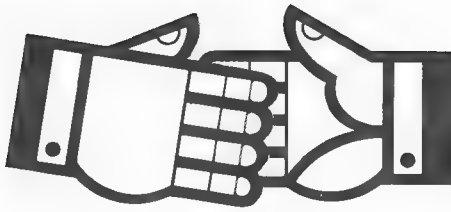
This will be the third move to larger quarters for the five-year-old manufacturer of electronic devices for microcomputers.

All operations except technical services and repair, which will remain in the present site in Garland, will be housed in the new 27,000 square-foot complex.

Mauch said the additional space and an improved telephone facility will "go a long way" to ease the pressure to expand, without diminishing the customer service that has sustained PERCOM's high growth rate.

PERCOM is a major supplier of mini-disk systems and system enhancement modules for TRS-80 and System-50 computers.

The new PERCOM building, which is in the final stages of construction, is situated at 11220 Pagemill Road, Dallas, Texas 75243.



OS-9 EXCHANGE

by Ken Orme

OS-9 Exchange will be a regular feature of SS-50 Computing, beginning with this issue. If you have ideas, utilities, new information, fixes or whatever, please contribute to this column. It will be a good way to have a forum for those who have purchased the OS-9 system, or for those who are interested in purchasing to at least check out some of the features of this system.

To begin this first column, we have a letter from one of our readers.

Dear Editor:

Thank you for the review of OS-9 in the March thru June issue of SS-50 Computing. I will be looking forward to more information on that system, both Level 1 and Level 2.

A few things in the review seem to require some clarification. First, Microware's ads refer to Level 1 as a single user system, while the review talks about more than one user on your Level 1 system. Apparently the TSMON (time sharing monitor) is involved here; additional information about this would be helpful. Also, can one user have more than one program running at the same time? (If so, is TSMON required for this?) Finally, can OS-9 be adapted by the user for non-standard hardware (terminal, printer, etc.)?

Jim Howell
San Jose, CA

I appreciate the questions brought up by Jim in his letter and think that it would be appropriate to answer them here.

On the subject of Level 1 being a single user system, let me say that the newer ads that have been put out by Microware® do clarify the fact that you may timeshare on either Level 1 or Level 2. In fact a quote from the ad says "(Both versions come with complete timesharing support)". I will mention more on this a bit later.

On the question of one user having more than one program running at the same time, the answer is "Yes". Again, the latest ad clarifies this point also, and more details are in this article.

The third question on adapting OS-9 is harder to answer. It really depends on the individual ability of the person doing the adapting. Generally, Microware will sell the operating system for almost all systems. The terminal configuration may be changed at any time by the TMODE command. Almost any configuration that I can think of would be handled without a problem, by this method. Now when it comes to printers, let me say that for the most part, there would be a problem trying to change printer drivers, except for the port to which it connects. In fact, I have a printer with an opposite strobe requirement from that in the OS-9 system. I'm sure it is a matter of

changing just a couple of bytes, but at least for now it won't run. I don't know which "couple of bytes" to change. Actually, the time spent trying to resolve this has only been a few minutes so far, but it is potentially a problem unless I have the source code.

To answer the third question is difficult, but terminal adaptation, yes, and other items, sometimes. All of you should realize, however, that many, many people cannot adapt printers with other disk operating systems either.

Since the first article on OS-9 appeared, the staff has been working more with the version 1.1 and found it to be an excellent operating system, with almost all of the minor problems in the first version totally resolved.

First of all, the manual itself has been greatly improved with the version 1.1 change. The new one is over 80 pages in length versus 64 in the first one. The very first part dealing with the overview of OS-9 now includes a section outlining the main features of OS-9. These include: True multiprogramming which includes running more than one program at once by a single user, 'Type-ahead' capability, active support for modular software, especially that found in ROM packages, a hierarchical file system, a unified I/O system, I/O redirection as desired, and the "shell" command interpreter which allows all of this without requiring complicated

user requirements.

The version 1.1 disk comes with a startup file built on it, and several directories to show the hierarchical method. With this system, the commands are set up in one file under their own directory and the system modules are located under the system directory. Right after you get the prompt to tell you that the system is up, if you type DIR you will see only four files: OS9Boot, SYS, CMDS, and STARTUP. From there you may look at the CMDS file by typing DIR CMDS and you may look at the SYS directory by typing DIR SYS. Also, at this point you may change directories with the CHD command by typing CHD CMDS. Then to look at the commands, all you need to do is type DIR.

Another thing that I should point out is that you may change the amount of memory used to perform various command programs. As the programs are loaded, they are allocated the minimum amount of working RAM memory specified by OS-9. Sometimes it is worthwhile to increase this memory size. As an example, if you were to type 'copy #2K file1 file2', that would invoke the memory modifier to allocate 2K of RAM for the copy process. This can help speed-up some of the modules if you have more memory available. And, speaking of memory, the newest ads mention Level 1 should have 32K to 56K of RAM, which seems to be a fair statement. Anything less than that would not allow all the capabilities of OS-9 to be used.

Now back to the question about timesharing. Before you may do any timesharing at all, you must have a real time clock or an interrupt timer in your system. With OS-9 we are really using "time slicing" because of the way it shares with other users. As an example, suppose there is a need for three users on a system. With the editor, a password file is created which includes the user name, the password, the user ID number, the initial process priority, the source and name of the

initial execution directory, the source and name of the initial data directory, and the name of the initial program to execute. For our example, one user named Bill will use BASIC09 and needs little priority to run it. Another named Sue will use the EDIT program and needs a medium priority. The third user named Joe needs to have a high priority and use the Shell. Bill can have his own directory on disk drive 1, with the working directory as drive 0. Sue may use the CMDS directory to see the other commands available. Joe can share the CMDS directory with Sue and have his own for a working directory. From this, you can see some of the possibilities. Notice that most of the information in the password file is for the initial process. After that, things may be altered by those that know the system, or left alone by those who don't. A password file could be created that will not allow the user anything except BASIC09 and their own directory. That will keep them out of trouble. Since the directories and files have security permissions attached to them, a user may be "locked out" of all but his own files. The system operator may change permissions on any of the files.

Then to get off the system, a user would only have to hit the escape as the first character on a line. That puts the terminal back in the "wait" mode, where nothing will come up until a carriage return is typed. Then the prompt is displayed again, and a name and password is asked for. If the password is incorrect for three tries, the terminal is again placed back in the "wait" mode.

On the question of running more than one program at the same time, here is the way it is done. Suppose that you wanted to output a long file to the printer (P) and at the same time edit a text file called text. To invoke the concurrent execution, simply type the following:

```
OS9: LIST FILE >/P& EDIT text
```

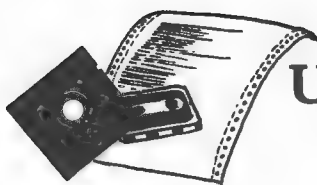
Since the LIST and EDIT programs were separated by the "&", they will run concurrently. If you prefer, you may type LIST FILE>/P& and then hit return. OS9 will come back with "&005" or some other number signifying the process number and then say 'OS9' again. You may then type in the name of the program you would like to run concurrently. The "&" sign is the key, since it must be placed between two programs in order for them to run concurrently.

The only real problem that we have discovered with this, comes when you are having both programs run to the same terminal at the same time. You then usually get "interlaced" lines from each program. But, since you would very seldom try to do that, it shouldn't be anything to concern you.

The I/O may be redirected by modifiers to allow it to go to alternate files or devices. By using the "less than" sign, you redirect the input path to the one you specify. By using the "greater than" signs, you are telling OS9 to redirect the error output path to where you specify. This means that you could get all the input information from disk number one, and output it all to the printer. The defaults are back to the terminal and/or the disk system.

The one item that seems to give us problems with the new version 1.1 is the VERIFY command. It will load in, but then promptly does nothing. It may be that we got a bad copy of it, but we will find out and report to you again.

In closing, it appears that other software groups are making the move to OS-9. One that we can tell you about is Computerware®. They are almost complete with their Random BASIC with 11 digit precision, to run on OS-9. Along with it will be their excellent business application software. As others get things finished, you will see more software available.



Utility Corner

"DISTAB" DISK DISASSEMBLER TABLE

For DDISEM Disk Dissembler

In the Nov/Dec issue of SS-50 Computing, we presented our DDISEM program which is a utility used to disassemble a program directly from a disk, rather than in memory. The purpose of this program is really to allow you to disassemble programs larger than your system memory would hold. It came about because of that very reason. We had a need to disassemble a large BASIC, but didn't have enough memory to even hold the BASIC interpreter itself. Therefore the origin of DDISEM.

In the letters to the editor column, we printed a letter received not too long ago asking where the ending to DDISEM was. Since we did overlook the follow-up program, it is only fair to make sure it gets in print, so here it is.

This program is called "DISTAB" which is the disk disassembler table. It must be used in conjunction with DDISEM in

order to operate. And, similarly, DDISEM must have the DISTAB program before it will function.

In order to use the pair of programs, simply key in each program separately, giving them the names DDISEM.TXT and DISTAB.TXT. Then you need to assemble each one individually. Call the first one DDISEM.BIN and the second DISTAB.BIN. Now the final requirement is simply to append the two together using the append command. For example, type: APPEND, DDISEM.BIN, DISTAB.BIN, DDISEM.CMD. This will put the appended file under the name DDISEM.CMD which will allow you to use it as a command, without the extension on the name.

To use the program, simply type, "DDISEM, FILENAM.EXT". The disk will load in DDISEM and then will disassemble the program with the filename that you asked

for directly from the disk. At the end of the disassembly it will also tell you the transfer address, which is quite often useful. Of course, if you desire to get a "hard copy" of the program, simply use the P command to send the disassembly to the printer.

We hope that you find this program useful, and apologize for the delay in printing it. At least you should be able to gain a little insight on how disassemblers work by studying the program, and possibly could modify it for other systems and other uses.

The listing is quite lengthy, but it is a nice utility to have around "just in case". If any of you readers have utility programs that you would like to share, simply send it to "SS-50 Computing, c/o The Utility Corner, P.O. Box 398, Garland, Utah 84312". If possible, include a 5¼" disk with the source on it so that the staff can go over it faster. The disk will be returned to you.

DISTAB DISK

```
*
* TABLES FOR USE BY DISASSEMBLERS
*
* (C) 1980 BY FRONTIER COMPUTING INC.
*
* 19 JUL 1980
*
* MNEMON CONTAINS MNEMONIC NUMBER
*
* FLAGTB CONTAINS THE FOLLOWING FLAGS
*
N2      EQU    $01      2 BYTES
N3      EQU    $02      3 BYTES
B       EQU    $04      B REGISTER
A       EQU    $08      A REGISTER
IM      EQU    $20      IMMEDIATE MODE
NDX     EQU    $40      INDEXED MODE
BRA     EQU    $80      RELATIVE MODE
* COMBINATIONS OF THE ABOVE
BR      EQU    BRA+N2
X       EQU    NDX+N2
AX      EQU    X+A
BX      EQU    X+B
AI      EQU    IM+A+N2
BI      EQU    IM+B+N2
A2      EQU    A+N2
A3      EQU    A+N3
B2      EQU    B+N2
B3      EQU    B+N3
*
* MNEMTB CONTAINS MNEMONICS
*
*
          ORG     $0400
*
MNEMON1 FCB     00,47,00,00,00,00,65,60
*
          FCB     39,35,20,59,25,57,26,58
*
          FCB     55,24,00,00,00,00,65,67
*
          FCB     00,32,00,01,00,00,00,00
```

	0419 20 00		
	041B 01 00		
	041D 00 00		
	041F 00		
41	0420 14	FCB	20,00,12,15,07,03,10,09
	0421 00 0C		
	0423 0F 07		
	0425 03 12		
	0427 09		
42	0428 16	FCB	22,23,19,17,10,16,11,14
	0429 17 13		
	042B 11 0A		
	042D 10 06		
	042F 0E		
43	0430 46	FCB	70,38,50,50,34,71,49,49
	0431 26 32		
	0433 32 22		
	0435 47 31		
	0437 31		
44	0438 00	FCB	00,54,00,53,00,00,72,64
	0439 36 00		
	043B 35 00		
	043D 00 43		
	043F 40		
45	0440 2E	FCB	46,00,00,30,45,00,52,06
	0441 00 00		
	0443 1E 2D		
	0445 00 34		
	0447 06		
46	0448 05	FCB	05,51,33,00,37,69,00,27
	0449 33 21		
	044B 00 25		
	044D 45 00		
	044F 1B		
47	0450 2E	FCB	46,00,00,30,45,00,52,06
	0451 00 00		
	0453 1E 2D		
	0455 00 34		
	0457 06		
48	0458 05	FCB	05,51,33,00,37,69,00,27
	0459 33 21		
	045B 00 25		
	045D 45 00		
	045F 1B		
49	0460 2E	FCB	46,00,00,30,45,00,52,06
	0461 00 00		
	0463 1E 2D		
	0465 00 34		
	0467 06		
50	0468 05	FCB	05,51,33,00,37,69,40,27
	0469 33 21		
	046B 00 25		
	046D 45 28		
	046F 1B		
51	0470 2E	FCB	46,00,00,30,45,00,52,06
	0471 00 00		
	0473 1E 2D		
	0475 00 34		
	0477 06		
52	0478 05	FCB	05,51,33,00,37,69,40,27

	0479 33 21				040B 03 00		
	047B 00 25				040D 00 2C		
	047D 45 28				040F 3E		
	047F 1B				65 04E0 3F	FCB	63,29,56,00,04,13,42,60
53	0480 3F	FCB	63,29,56,00,04,13,42,00		04E1 1D 38		
	0481 1D 38				04E3 00 04		
	0483 00 04				04E5 00 2A		
	0485 00 2A				04E7 3C		
	0487 00				66 04E8 24	FCB	36,02,48,03,00,00,44,62
54	0488 24	FCB	36,02,48,03,31,21,43,00		04E9 02 30		
	0489 02 30				04EB 03 00		
	048B 03 1F				04ED 00 2C		
	048D 15 2B				04EF 3E		
	048F 00				67 04F0 3F	FCB	63,29,56,00,04,13,42,60
55	0490 3F	FCB	63,29,56,00,04,13,42,60		04F1 1D 38		
	0491 1D 38				04F3 00 04		
	0493 00 04				04F5 00 2A		
	0495 00 2A				04F7 3C		
	0497 3C				68 04F8 24	FCB	36,02,48,03,00,00,44,62
56	0498 24	FCB	36,02,48,03,31,00,43,61		04F9 02 30		
	0499 02 30				04FB 03 00		
	049B 03 1F				04FD 00 2C		
	049D 00 2B				04FF 3E		
	049F 3D				69	*	
57	04A0 3F	FCB	63,29,56,00,04,13,42,60	70	0500 00	FLAGTB FCB	0,0,0,0,0,0,0,0
	04A1 1D 38				0501 00 00		
	04A3 00 04				0503 00 00		
	04A5 00 2A				0505 00 00		
	04A7 3C				0507 00		
58	04A8 24	FCB	36,02,48,03,31,41,43,61	71	0508 00	FCB	0,0,0,0,0,0,0,0
	04A9 02 30				0509 00 00		
	04AB 03 1F				050B 00 00		
	04AD 29 2B				050D 00 00		
	04AF 3D				050F 00		
59	04B0 3F	FCB	63,29,56,00,04,13,42,60	72	0510 00	FCB	0,0,0,0,0,0,0,0
	04B1 1D 38				0511 00 00		
	04B3 00 04				0513 00 00		
	04B5 00 2A				0515 00 00		
	04B7 3C				0517 00		
60	04B8 24	FCB	36,02,48,03,31,41,43,61	73	0518 00	FCB	0,0,0,0,0,0,0,0
	04B9 02 30				0519 00 00		
	04BB 03 1F				051B 00 00		
	04BD 29 2B				051D 00 00		
	04BF 3D				051F 00		
61	04C0 3F	FCB	63,29,56,00,04,13,42,00	74	0520 81	FCB	BR,BR,BR,BR,BR,BR,BR,BR
	04C1 1D 38				0521 81 81		
	04C3 00 04				0523 81 81		
	04C5 00 2A				0525 81 81		
	04C7 00				0527 81		
62	04C8 24	FCB	36,02,48,03,00,00,44,00	75	0528 81	FCB	BR,BR,BR,BR,BR,BR,BR,BR
	04C9 02 30				0529 81 81		
	04CB 03 00				052B 81 81		
	04CD 00 2C				052D 81 81		
	04CF 00				052F 81		
63	04D0 3F	FCB	63,29,56,00,04,13,42,60	76	0530 00	FCB	0,0,A,B,0,0,A,B
	04D1 1D 38				0531 00 00		
	04D3 00 04				0533 04 00		
	04D5 00 2A				0535 00 00		
	04D7 3C				0537 04		
64	04D8 24	FCB	36,02,48,03,00,00,44,62	77	0538 00	FCB	0,0,0,0,0,0,0,0
	04D9 02 30				0539 00 00		

	0538 00 00				059F 01		
	053D 00 00				90 05A0 49	FCB	AX,AX,AX,0,AX,AX,AX,AX
	053F 00				05A1 49 49		
78	0540 00	FCB	A,0,0,A,A,0,A,A		05A3 00 49		
	0541 00 00				05A5 49 49		
	0543 00 00				05A7 49		
	0545 00 00				91 05A8 49	FCB	AX,AX,AX,AX,X,X,X,X
	0547 00				05A9 49 49		
79	0548 00	FCB	A,A,A,0,A,A,0,A		05AB 49 41		
	0549 00 00				05AD 41 41		
	054B 00 00				05AF 41		
	054D 00 00				92 05B0 0A	FCB	A3,A3,A3,0,A3,A3,A3
	054F 00				05B1 0A 0A		
80	0550 04	FCB	B,0,0,B,B,0,B,B		05B3 00 0A		
	0551 00 00				05B5 0A 0A		
	0553 04 04				05B7 0A		
	0555 00 04				93 05B8 0A	FCB	A3,A3,A3,A3,N3,N3,N3,N3
	0557 04				05B9 0A 0A		
81	0558 04	FCB	B,B,B,0,B,B,0,B		05BB 0A 02		
	0559 04 04				05BD 02 02		
	055B 00 04				05BF 02		
	055D 04 00				94 05C0 25	FCB	B1,B1,B1,0,B1,B1,B1,0
	055F 04				05C1 25 25		
82	0560 41	FCB	X,0,0,X,X,0,X,X		05C3 00 25		
	0561 00 00				05C5 25 25		
	0563 41 41				05C7 00		
	0565 00 41				95 05C8 25	FCB	B1,B1,B1,B1,0,0,IM+N3,0
	0567 41				05C9 25 25		
83	0568 41	FCB	X,X,X,0,X,X,X,X		05CB 25 00		
	0569 41 41				05CD 00 22		
	056B 00 41				05CF 00		
	056D 41 41				96 05D0 05	FCB	B2,B2,B2,0,B2,B2,B2,B2
	056F 41				05D1 05 05		
84	0570 02	FCB	N3,0,0,N3,N3,0,N3,N3		05D3 00 05		
	0571 00 00				05D5 05 05		
	0573 02 02				05D7 05		
	0575 00 02				97 05D8 05	FCB	B2,B2,B2,B2,0,0,N2,N2
	0577 02				05D9 05 05		
85	0578 02	FCB	N3,N3,N3,0,N3,N3,N3,N3		05DB 05 00		
	0579 02 02				05DD 00 01		
	057B 00 02				05DF 01		
	057D 02 02				98 05E0 45	FCB	BX,BX,BX,0,BX,BX,BX,BX
	057F 02				05E1 45 45		
86	0580 29	FCB	A1,A1,A1,0,A1,A1,A1,0		05E3 00 45		
	0581 29 29				05E5 45 45		
	0583 00 29				05E7 45		
	0585 29 29				99 05E8 45	FCB	BX,BX,BX,BX,0,0,X,X
	0587 00				05E9 45 45		
87	0588 29	FCB	A1,A1,A1,A1,IM+N3,BR,IM+N3,0		05EB 45 00		
	0589 29 29				05ED 00 41		
	058B 29 22				05EF 41		
	058D 01 22				100 05F0 06	FCB	B3,B3,B3,0,B3,B3,B3,B3
	058F 00				05F1 06 06		
88	0590 09	FCB	A2,A2,A2,0,A2,A2,A2,A2		05F3 00 06		
	0591 09 09				05F5 06 06		
	0593 00 09				05F7 06		
	0595 09 09				101 05F8 06	FCB	B3,B3,B3,B3,0,0,N3,N3
	0597 09				05F9 06 06		
89	0598 09	FCB	A2,A2,A2,A2,N2,0,N2,N2		05FB 06 00		
	0599 09 09				05FD 00 02		
	059B 09 01				05FF 02		
	059D 00 01						

102	*		0670 4E 43
103	*		0672 49 4E
104	0600 20	MMEMTB FCC ' ? '	0674 53 49
	0601 3F 20		0676 4E 58
105	0603 41	FCC 'ABADOCADODANDASLASRBCBCSEBEGE'	0678 4A 4D
	0604 42 41		067A 50
	0606 41 44	109	067B 4A
	0608 43 41		067C 53 52
	060A 44 44		067E 4C 44
	060C 41 4E		0680 41 4C
	060E 44 41		0682 44 53
	0610 53 4C		0684 4C 44
	0612 41 53		0686 58 4C
	0614 52 42		0688 53 52
	0616 43 43		068A 4E 45
	0618 42 43		068C 47 4E
	061A 53 42		068E 4F 50
	061C 45 51		0690 4F 52
	061E 42 47		0692 41 50
	0620 45		0694 53 48
106	0621 42	FCC 'BGTBIBITBLELSLBTBIBNEPLBRA'	0696 50 55
	0622 47 54		0698 4C
	0624 42 48	110	0699 52
	0626 49 42		069A 4F 4C
	0628 49 54		069C 52 4F
	062A 42 4C		069E 52 52
	062C 45 42		06A0 54 49
	062E 4C 53		06A2 52 54
	0630 42 4C		06A4 53 53
	0632 54 42		06A6 42 41
	0634 40 49		06A8 53 42
	0636 42 4E		06AA 43 53
	0638 45 42		06AC 45 43
	063A 50 4C		06AE 53 45
	063C 42 52		06B0 49 53
	063E 41		06B2 45 56
107	063F 42	FCC 'BSRBUCBUSCBACCOLICLCLUCHPCOM'	06B4 53 54
	0640 53 52		06B6 41
	0642 42 56	111	06B7 53
	0644 43 42		06B8 54 53
	0646 56 53		06BA 53 54
	0648 43 42		06BC 58 53
	064A 41 43		06BE 55 42
	064C 4C 43		06C0 53 57
	064E 43 4C		06C2 49 54
	0650 49 43		06C4 41 42
	0652 4C 52		06C6 54 41
	0654 43 4C		06C8 50 54
	0656 56 43		06CA 42 41
	0658 40 50		06CC 54 50
	065A 43 4F		06CE 41 54
	065C 40		06D0 53 54
108	065D 43	FCC 'CPXDADECDSEDEXEGRINCINSINXJMP'	06D2 54 53
	065E 50 58		06D4 58
	0660 44 41	112	06D5 54
	0662 41 44		06D6 58 53
	0664 45 43		06D8 57 41
	0666 44 45		06DA 49
	0668 53 44	113	
	066A 45 58	114	
	066C 45 4F	115	
	066E 52 49		
			*
			*
			END

6809 Relocating Recursive Macro Assembler & Loader/Linker with text editor

- Runs on 6809 system (in as little as 32k)
- Interactive or non-interactive (batch) mode
- Supports relocatable and absolute code
- Can assemble 6800 & 6801 source and generate 6809 object
- CROSS ASSEMBLER MODE—can assemble 6800 & 6801 source and generate 6800 & 6801 object
- 8 character global and local labels
- 76 English error messages
- Alphabetized or non-alphabetized symbol table
- Cross reference table
- Checks for unreferenced labels
- Can enable the insertion of a 'SWI' after every instruction
- Supports the following assembler directives: ASECT, CSECT, PSECT, DEBUGS, END EQU, EXEC, EXT, FCB, FCC, ID, INT INCLUDE, NAM, OPT, ORG, PAG, RMB SET, SETDP, SPC, TTL, FDB
- Program sectioning (ASECT, CSECT, or PSECT)
- Source of I/O routines supplied
- Total FLEX* compatibility
- Powerful co-resident text editor
- TSC source file compatibility

Powerful Macro Capabilities

- 8 character symbolic (substitution) labels
- branch on conditions EQ, NE, LE, LT GT, GE
- supports nesting
- Logical, arithmetic, and string labels
- Sublist processing
- Powerful string functions such as SUBSTRING
- Supports the following directives ACNT, AGO, AIF, ANOP, GBLA, GBLB, GBLC LCLA, LCLB, LCLC, MACRO, MEND, MNOTE SETA, SETB, SETC

Loader/Linker

- Link and load (with offset)
- Link and save
- Global cross references
- Supports the following commands LOAD, COMPARE, SAVE, EDIT, LINK, MAP INTERNALS, UNDEFINED, CLEAR, RUN SECTION, FIX

MASM 6809 ----- \$ 250.00

User's Manual Only (about 200 pages—refundable)—
\$ 25.00

A version of the above assembler which generates ABSOLUTE code is also available

ASMB 6809 ----- \$ 150.00

The above software is available on 5 or 8 inch FLEX* disks, prices include one year maintenance (single CPU). Even if you already own an assembler you should seriously consider ordering these powerful tools.

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Cincinnati, Ohio 45219

(513) 751-6203 (evenings)

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BASIC09™

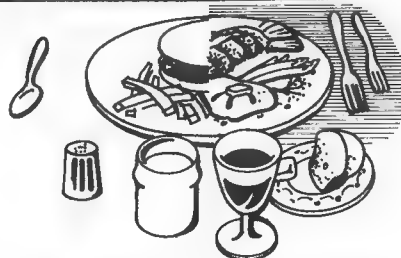
has a dual personality.

**One
craves
meat-and-
potatoes
BASIC.**



**The
other
prefers
Programme
ala Pascal.**

Some people say BASIC09 is really a PASCAL in disguise, others say it's still BASIC. You'll understand this delightful dilemma when you look at both versions of the "bubble sort" program shown below: both can be run by BASIC09. The program on top is unstructured and hard to understand, but it's traditional BASIC. The program on the bottom is well-structured and easy to follow, a virtue of PASCAL. With BASIC09 you can program either way, or mix the best of both. It's like getting two languages for the price of one.



LOOP . . ENDLOOP, FOR . . NEXT and IF . . THEN . . ELSE. If one of the five built-in data types (byte, integer, real, string, and boolean) doesn't suit the problem, you can make a new one of your liking with the TYPE statement. Need a tree, linked list, or symbol table? Complex non-rectangular data structures using any combination of data types are easy to define. Modular programming breaks down large programs to smaller, more manageable elements. BASIC09 lets you create independent program modules called "procedures" with local variables for recursion plus parameter passing to any other BASIC09 or machine language procedure. There is a complete set of statements for device-independent sequential or random I/O, plus a superlative PRINT USING system.

Makes programs faster

No full-feature BASIC for any 8-bit microprocessor is faster than BASIC09, because it is an interactive compiler. As each program line is entered, it is instantly compiled to a smaller, faster form. Because BASIC09 automatically converts programs back to original "source" form for listing, it is as friendly and easy-to-use as traditional interpreter BASICs. Each procedure can be independently compiled to position-independent, reentrant, ROMable format. Microware® developed a new ultra-fast 9-digit-accuracy floating point math system just for BASIC09. And if that's still

not fast enough, there's BYTE and INTEGER arithmetic.

Features that make programs easier to write

The compiler is integrated with a full-feature string AND line-number oriented text editor. If you make a mistake, BASIC09 tells you instantly. String-oriented commands such as search, change, change all occurrences, delete, and insert can be used on programs with or without line numbers. There's an automatic line renumbering function too.

Features that make programs easy to test

Debugging often takes longer than writing a program. That's why BASIC09's integral high-level debugger sets it apart from all other compiled OR interpretive languages. The TRACE command shows you each statement executed in BASIC form, plus the result of any expression evaluation. STEP lets you run one or more statements at a time. LET and PRINT allow you to examine or change the values of variables, by name. STATE lists procedure calling order. And there are nine other debug commands. If you need to correct a program, you can edit, recompile, and rerun it in seconds.

Microware® software is available for most popular 6809 computer systems. Source listings and yearly maintenance update service are sold separately for most programs.

Write or call for our free catalog. We accept phone orders and MasterCard and VISA orders.

SORT AN ARRAY IN ASCENDING SEQUENCE

```
90 DIM A(5)
100 I=5
110 IF I=1 THEN 200
120 FOR J=1 TO I-1
130 IF A(J)<=A(J+1) THEN 170
140 T=A(J+1)
150 A(J+1)=A(J)
160 A(J)=T
170 NEXT J
180 I=I-1
190 GOTO 110
200 RETURN
```

```
DIM array(5)
outer=5
WHILE outer>1 DO
  outer=outer-1
  FOR inner=1 TO outer
    IF array(inner)>=array(inner+1) THEN
      temp=array(inner+1)
      array(inner+1)=array(inner)
      array(inner)=temp
    ENDIF
  NEXT inner
ENDWHILE
RETURN
```

Makes programs better

BASIC09 has five kinds of loop structures: WHILE . . DO, REPEAT . . UNTIL,



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Does timesharing on a small system make sense?

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Now two (or more) acts can share your microcomputer stage. You will no longer have to walk away from your computer while it is busy running a long program. Because OS-9 is a multitasking operating system, you can be running a BASIC program while editing a PASCAL program, for example. This lets you make more efficient use of your time and your system, even if you only use one terminal. If your application requires multiple, independent terminals, one OS-9 system can do the work of several single-user systems.

The convenience of an advanced operating system

Sophistication does not require complexity. Many OS-9 users say that it is actually easier to use than the older 6800-type operating systems. Consider how easy it is to run multiple programs: to run a program you just type its name and hit 'return.' To run a program as a separate job, you type its name, an '@' character, then hit return. The program runs as usual, but OS-9 comes back immediately and is ready for your next command. Simple commands let you see each program's status, set its priority, or abort it.

The file management system has fast, byte-addressable random-and sequential-access files. The tree-structured multiple directory system lets you create separate disk directories for each user, project, or

application. Command line I/O file redirection means you specify what device and/or files a program will use when you run it, not when you write it.

Efficiency and hardware versatility

No other operating system can run on such a broad range of hardware: the overall RAM requirement for Level One is 32K to 56K RAM. Memory utilization is superlative because OS-9 lets multiple tasks "share" the same reentrant program. For example, if two users run BASIC09, only one "copy" is actually loaded into memory. The Level Two version of OS-9 can utilize up to a megabyte of memory on systems having memory management hardware (both versions come with complete timesharing support).

OS-9's device independent I/O system can handle almost any number and combination of I/O

devices: five or eight inch diskettes, winchester disks, disk cartridges, serial and parallel ports, memory-mapped video displays, and more.

Microware® offers a large selection of "stock" device interface software modules, or you can create your own: all the information you need is in the manuals.

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Each OS-9 package comes with a User's Manual and a System Programmer's Manual that cover every aspect of OS-9. If you have special requirements, you can even purchase the Source Code for most of OS-9 and related software. At Microware® we take pride in offering the best customer support in the business. Technical advice and assistance by phone, mail or telex is available during all business hours.

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6801, 68701, & 6803 MICROCOMPUTER PROGRAMMING AND INTERFACING

by Gary Manning

**6801, 68701, & 6803
Microcomputer Programming
and Interfacing
by Andrew C. Staugaard, Jr.**

**Howard W. Sams
349 Pages**

While the trend in the microcomputer industry is for bigger and faster hardware, there is also a more subtle yet equally important trend to combine more existing hardware and capability in a single package. Hence the true single-chip computer.

The 6801 series of microcomputers is perhaps the most flexible on the market. These devices are intended to be used as industrial controllers, automotive computers, intelligent controllers for consumer products, etc. They are upward software compatible with the 6800 microprocessor with the addition of 11 new instructions including operations on the "D" accumulator (A & B combined) and an 8 bit by 8 bit multiply similar to the 6809. They are also compatible with other 6800 family devices. Included in the 40 pin package are: an enhanced 6800 microprocessor, 128 byte RAM, 2K ROM, a CPU clock, a timer, a serial communications interface, and additional I/O or external memory depending on the operation mode.

The 2K ROM is mask programmed in the 6901. It is deleted from the 6803, and is replaced by a 2K EPROM in the 68701. There is also a version of the 6801 (6801L1 & 6801P1) which has a LILbus (tm Motorola) monitor mask programmed in the ROM area. Otherwise the devices are all identical in operation.

Mr. Staugaard has included the LILbus monitor description in the appendix of the book, and overall makes the reader aware of the many possible features and uses of the series.

The devices covered can be configured in one of three fundamental operating modes, depending on the desired application. They are:

Single Chip: Three 8-bit parallel ports, no external memory

Expanded-nonmultiplexed: One 8-bit parallel port, 8 data lines, and 8 address lines

Expanded multiplexed: One 8-bit parallel port, 8 high order address lines, 8 lines multiplexed to give 8 low order address lines and 8 data lines.

There are really 8 unique operating modes, and they are all covered in very good detail in the book.

The author assumes a basic understanding of microprocessor operation, but is very thorough in describing the 6801 series, their features, architecture and some possible uses.

Most examples of applications deal with possible automotive uses such as timing, dwell and RPM, but also included are temperature monitoring, analog to digital conversion, digital to analog conversion, interfacing with keyboards and displays, and remote data acquisition.

The book has 9 chapters with review questions at the end of each and includes a complete summary of executable instructions. Also spec sheets on the 6801 series and most other hardware used in examples in the book.

A few of the chapter titles are: Mode Selection and Port Usage, Using the 6801/68701/6803 On-Chip Memory, How to Use the 6801 On-Chip Timer, How To Use the On-Chip Serial Communications, General Interfacing, and 6801 Applications. The other four chapters have been mentioned in part.

This book is a part of the Blacksburg Continuing Education Series (tm) and I recommend it highly to anyone interested in this area of microprocessor applications.

[SS-50]



New Products

COLOR DATA ORGANIZER

Computerware introduces its COLOR DATA ORGANIZER on cassette for the Radio Shack Color Computer.

The Color Data Organizer is a must for those who would like to do something meaningful with their Color Computer. It is a small inventory system, a cross reference system, a valuable papers, serial number, credit cards, etc. storage system - it is whatever you want it to be! It stores, retrieves, sorts, prints and totals whatever you want within the two numeric and two string entries. It holds 125 records in a 16K Color Computer.

With Computerware's Color Data Organizer you can collect, organize, and print your information in your own data base. The list of things that the Color Data Organizer can help with is long enough to use the Color Data Organizer to keep track of them!

The Color Data Organizer costs only \$24.95 and is available directly from Computerware at Box 668, 1472 Encinitas Blvd., Encinitas, CA 92024. (714)436-3512.

COMPUTER SYSTEMS CONSULTANTS

1454 Latta Lane
Conyers, Georgia 30207
Telephone 404-483-1717/4570

Computer Systems Consultants announces the availability of TABULA RASA. This product provides an electronic spreadsheet facility for 6809 systems which can run the TSC Extended Basic Interpreter and the TSC Macro Assembler. It will operate with most serial terminals and memory-mapped video displays which provide at least 16 rows and 64 columns on the screen, and

requires at least 56K bytes of RAM.

TABULA RASA is based upon the CSC Full-Screen Display package. An interactive system generation procedure is used to help the user customize the display drivers for a specific terminal/computer configuration. In most cases, this procedure is sufficient to complete the customization with no further effort.

Data is entered into formatted screens representing the logical classifications of information comprising a spreadsheet, as follows:

Report Headings,
Initial Values,
Computational Instructions.

Results are placed into a file representing a fourth classification called Computer Values. Any of the four classifications of information in a spreadsheet may be displayed on the terminal or on a printer. Any of the first three classifications may be updated relatively independently of one another. Utility programs allow any of the first three classifications to be used as a part of another spreadsheet, and allow a Computed Values file to be used as a part of an Initial Values file for another spreadsheet.

The maximum size spreadsheet which may be processed by TABULA RASA depends upon the amount of work disk available. A single-sided, single-density, mini-diskette would easily contain a spreadsheet of 100 rows by 25 columns, with 100 computational instructions.

The retail price of TABULA RASA is \$100.00. This includes the source files for all programs, on mini or full-size diskettes, and the instruction manual. Dealer inquiries are welcome and should be directed to Bud Pass.

COMPUTERWARE Introduces MAGIKUBE

Computerware introduces its MAGIKUBE on cassette for the Radio Shack Color Computer.

Magikube is a computer version of RUBIK'S CUBE. It

honestly is not for anyone who gives up easily! You have the option of scrambling the cube yourself or of several levels of scramble by the Color Computer. Then, the objective is to restore the cube back to its original state. Magikube uses the highest level of graphics and, because it is not easy, there is a tape save feature which allows you to save your cube and continue later.

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MAGIC SPELL

Now your 6800 or 6809 system can proofread your text files for spelling and typographical errors in just minutes.

Magic Spell (tm) compares each word in a text file against a master dictionary file, and displays or prints every word not found.

The program is written in machine language and is extremely fast and compact - it will run in systems as small as 16K, and can proofread documents much larger than can be held in memory.

Magic Spell is supplied with a core dictionary containing thousands of English words. The dictionary is easily modified by any text editor and can quickly be customized by the addition of technical terms or even names. Moreover, as new words are encountered in your text files, *Magic Spell* can add them to your dictionary automatically.

Magic Spell is now available in versions for Technical Systems Consultants' MiniFLEX, FLEX 2.0, and FLEX 9 disk operating systems, as well as for Percom disk systems, and costs \$89.29 with source code and dictionary on disk. OS-9 and SSB disk versions will be available soon.

For further information write for our catalog or call (914) 241-0287. If you call in the late evening, turn on your modem and LIST MAGIC.DAT.

Mind-Blowing Color Graphics

by Harold Mauch
President, Percom Data Company

One day last week, Tim McKee of our staff poked his head in my office and asked, "You wanna see something that will make your day?"

I was pretty well blitzed after spending the whole morning with an architect reviewing plans for our new 30,000 square-foot building; I didn't know whether to be annoyed at Tim's intrusion or delighted at a chance to escape. It wasn't a difficult decision.

I followed Tim to an unexplored corner of our main building where he designs 680X systems. Tim and Barney, one of our printed circuit designers, share what was once a stockroom. Now it's a mass of equipment and a mess of layouts, printouts and listings. A blackboard with a status chart of long-forgotten projects was the only item in the room that

showed any semblance of order. Before I could query Tim about one of the projects, he brought up his system.

On a color monitor, perched on a stack of dog-eared listings, appeared expanding, shimmering circles -- framed circles, exploding circles, rotating circles, tension circles. Tim's mesmerizing psychedelics sent the mind reeling -- in circles, of course.

Finally, I realized that Tim had just described the system hardware: "...our Colorama card, an SBC/9, one of our M24SS static RAM cards..." And now was explaining how he could generate such dazzling animated displays: "Because display memory is in the processor map, update speed and animation detail are limited only by the processor itself. Which, with a 6809, is quite fast."

About this time somebody bumped Tim's bench. The monitor teetered. "Watch out!" I exclaimed. Tim, grinning sheepishly, steadied the stack of listings and went on.

"I'm using ASCII commands so the display is not as fast as direct memory commands, but the program interface is simpler. A circle is defined by setting its center coordinates in memory, then computing the circle X and Y points using the Pythagorean theorem. This approach is faster than a trig function and each calculation locates eight points. The shimmer effect happens because points overlap as the algorithm draws the circle -- eight points at a time."

I told Tim to clear up the software a bit (a bit?) if necessary, and we'd make his program available through the LFD Users Group. Wistfully, I headed back to my office, to the architect's plans and to other mundane pursuits.

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SPEECH PATCH FOR SUPER BASIC

by Tim McKee

Ed. Note: The last issue of the "Peripheral" introduced the subject of speech generation using a Texas Instruments' SPEAK & SPELL equipped with a Percom SPEAK-2-ME-2 [tm] adapter.

The listing given in this issue will allow you to patch Percom Super BASIC, version 1.0x, for speech. The pi function and tape commands have been eliminated.

New Function

SP 20 LET A=SP

When line 20 is executed, it will return A equal to the current status of the SPEAK & SPELL:

A=0 when not speaking

A=1 for speech in progress

New Commands

S(20 S(1000)

Line 20 will "speak" the word at address 1000 of the SPEAK & SPELL vocabulary. If the delay command, D(, was used previously, a delay will follow and then execution will continue.

W(20 W(1000)

Line 20 will "speak" the word at address 1000 of the SPEAK & SPELL vocabulary, wait for the word to end and then continue.

D(20 D(25)

Line 20 will set the delay associated with the S(command to 25. The delay is set in 0.1 millisecond increments. The delay is reset to zero after each S(command.

SL 20 SL

Line 20 will cause the next word to be spoken at half speed (slow speech).

NOTES

1. The address of words are *not* the same as those given in the SPEAK-2-ME-2 (tm) users manual. The addresses can be obtained with the following program:

```
10 INPUT "OLD VALUE ",O
20 IF O<0 LET O=65536+O
30 LET A=INT(O/256)
40 LET B=O-(256*A)
50 PRINT "NEW VALUE ";A+(256*B)
60 W( A+(256*B) )
70 GOTO 10
```

2. New words may be formed by setting the delay with the D(command, outputting the beginning of one word using the S(command, allowing the first part of the word to be spoken and then outputting another word.

PATCH FOR SUPER BASIC 1.00			
(8000)	PIA	EQU	\$8000
(8000)	PIADTA	EQU	PIA
(8001)	PIACTA	EQU	PIA+1
(8002)	PIADTB	EQU	PIA+2
(8003)	PIACTB	EQU	PIA+3
(003C)	CA2HI	EQU	\$3C
(0034)	CA2LO	EQU	\$34
(237F)	NUMPAR	EQU	\$237F
(0ADE)	DCBIN2	EQU	\$ADE
(19C4)	CLRNUM	EQU	\$19C4
(0059)	NUMSTK	EQU	\$59
(1FCF)	DATA	EQU	\$1FCF
(0238)	ORG	\$238	PATCH BASIC FUNCTION TABLE
0238 53	FCC	'SP'	REPLACE FUNCTION 'PI'
023A 00	FCB	0	
023B 2F AE	FDB	SPKFNC	
(0371)	ORG	\$371	PATCH BASIC COMMAND TABLE
0371 53	FCB	'S, '(,0	SPEAK WORD AND DELAY IF REQUESTED
0374 2F 00	FDB	SPK	

0376	57	FCB	'W,'(,0	SPEAK WORD AND WAIT TILL FINISHED
0379	2F 12	FDB	SPKWT	
037B	44	FCB	'D,'(,0	SET DELAY FOR NEXT 'S(' COMMAND
037E	2F 7E	FDB	SPKD	
0380	53	FCB	'S,'L,0	SET SLOW SPEECH MODE
0383	2F A6	FDB	SPKSLW	

(2F00)		ORG	\$2F00	UNUSED SPACE	
2F00	8D 1D	SPK	BSR	SPKIT	
2F02	FE 2FD0		LDX	DELAY	DELAY IF NEEDED
2F05	27 15		BEQ	SPKX	
2F07	C6 10	SPK1	LDA B	#16	2F5F 64 00 SPEAK8 LSR 0,X
2F09	5A	SPK2	DEC B		2F61 66 01 ROR 1,X
2F0A	26 FD		BNE	SPK2	2F63 46 ROR A
2F0C	09		DEX		2F64 5A DEC B
2F0D	26 F8		BNE	SPK1	2F65 26 F8 BNE SPEAK8
2F0F	4F		CLR A		2F67 33 PUL B
2F10	20 72		BRA	SPKDX	2F68 8D 23 BSR OUTDIG
*RESET DELAY TO 0 AND RETURN					2F6A 5A DEC B
2F12	8D 0B	SPKWT	BSR	SPKIT	2F6B 26 EE BNE SPEAK7
2F14	BD 2FC4		JSR	STSSTR	2F6D 86 80 LDA A ##80
2F17	B6 8002	SPKW1	LDA A	PIADTB	2F6F 8D 22 BSR STROBE
2F1A	2A FB		BPL	SPKW1	2F71 B6 2FCF LDA A SPEED
2F1C	7E 1FCF	SPKX	JMP	DATA	2F74 8D 1D BSR STROBE
2F1F	BD 237F	SPKIT	JSR	NUMPAR	2F76 31 INS
2F22	BD 0ADE		JSR	DCBIN2	2F77 31 INS
2F25	37		PSH B		2F78 86 A0 LDA A ##A0
2F26	36		PSH A		2F7A B7 2FCF STA A SPEED
2F27	30		TSX		2F7D 39 RTS
2F28	7D 2FD2		TST	STSACT	2F7E BD 237F SPKD JSR NUMPAR
2F2B	27 06		BEQ	SPEAK4	2F81 BD 0ADE JSR DCBIN2
2F2D	4F		CLR A		2F84 B7 2FD0 SPKDX STA A DELAY
2F2E	B7 2FD2		STA A	STSACT	2F87 F7 2FD1 STA B DELAY+1
2F31	8D 60		BSR	STROBE	2F8A 7E 1FCF JMP DATA
2F33	7D 2FCE	SPEAK4	TST	INIT	2F8D 36 OUTDIG PSH A
2F36	26 21		BNE	SPEAK6	2F8E 86 20 LDA A ##20
2F38	7F 8001		CLR	PIACTA	2F90 8D 01 BSR STROBE
2F3B	7F 8003		CLR	PIACTB	2F92 32 PUL A
2F3E	86 FF		LDA A	##FF	2F93 43 STROBE COM A
2F40	B7 8000		STA A	PIADTA	2F94 B7 8000 STA A PIADTA
2F43	7F 8002		CLR	PIADTB	2F97 86 34 LDA A #CA2LO
2F46	86 3C		LDA A	#CA2HI	2F99 B7 8001 STA A PIACTA
2F48	B7 8001		STA A	PIACTA	2F9C 36 PSH A
2F4B	B7 8003		STA A	PIACTB	2F9D 32 PUL A
2F4E	C6 05		LDA B	#5	2F9E 36 PSH A
2F50	4F	SPEAK5	CLR A		2F9F 32 PUL A
2F51	8D 40		BSR	STROBE	2FA0 86 3C LDA A #CA2HI
2F53	5A		DEC B		2FA2 B7 8001 STA A PIACTA
2F54	26 FA		BNE	SPEAK5	2FA5 39 RTS
2F56	7C 2FCE		INC	INIT	
2F59	C6 05	SPEAK6	LDA B	#5	
2F5B	4F	SPEAK7	CLR A		2FA6 86 60 SPKSLW LDA A ##60
2F5C	37		PSH B		2FA8 B7 2FCF STA A SPEED
2F5D	C6 04		LDA B	#4	2FAB 7E 1FCF JMP DATA

```

2FAE 7D 2FD2 SPKFNC TST STSACT
2FB1 26 02 BNE STATS1
2FB3 8D 0F BSR STSSTR
2FB5 BD 19C4 STATS1 JSR CLRNUM
2FB8 DE 59 LDX NUMSTK
2FBA B6 8002 LDA A PIADTB
2FBD 2B 04 BMI SPKFNC
2FBF 6C 00 INC 0,X
2FC1 6C 06 INC 6,X
2FC3 39 SPKFNC RTS

```

```

2FC4 86 E0 STSSTR LDA A ##EO
2FC6 B7 2FD2 STA A STSACT
2FC9 8D C8 BSR STROBE
2FCB 4F CLR A
2FCC 20 C5 BRA STROBE

```

```

2FCE 00 INIT FCB 0
2FCF A0 SPEED FCB $A0
2FD0 00 00 DELAY FDB 0
2FD2 00 STSACT FCB 0

```

END

00 ERROR(S) DETECTED

ELECTRIC CRAYON [tm] ALARM CONTROLLER

by Sam Campbell

The ELECTRIC CRAYON is more than just a low-cost peripheral for adding color to a computer. Possibly because it was introduced before its time, little is really known about the CRAYON'S capabilities. As Tim McKee showed in his article, the ELECTRIC CRAYON is a self-contained control computer with built-in color graphics capability. It has many applications. Here's an alarm system that I have implemented with an ELECTRIC CRAYON.

Alarm systems do not have to be complicated, so why a computer-controlled alarm? The answer is speed. And improved security -- a computer-controlled alarm can be hard to detect. A computer alarm needn't be expensive. An ELECTRIC CRAYON, which is ideal for this application, costs about \$250.00, including the necessary display RAM. Only a few other components are required: 1-Kbyte of program RAM and 1-Kbyte of EPROM, which are accommodated by the ELECTRIC

CRAYON, a 6821 PIA chip to activate the CRAYON'S auxiliary port and, of course, cabling.

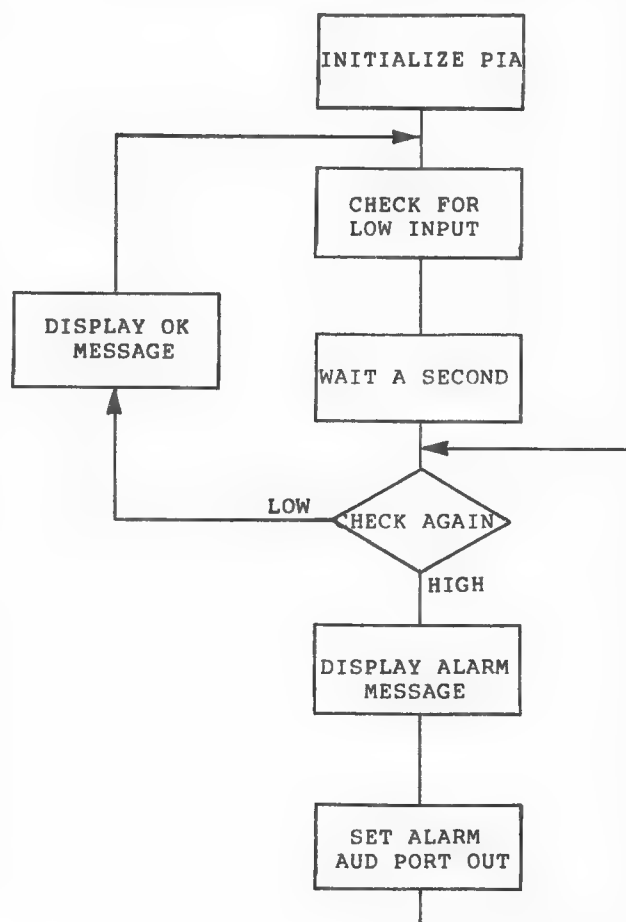
The sensor devices, reed switches, are readily available, simple to install and easy to connect. For a door sensor, the switch magnet is attached to the door. If the door is closed, the switch is closed. Window sensors can be similarly installed.

A possible set up is to use one bit for all sensors of a room, the sensors being connected in series. Alternatively, an entire house could be monitored using one large loop, leaving all the remaining 15 bits free for other chores -- to control the lighting in rooms, for example.

A program flow chart for operating this alarm system is given below. The code should be in EPROM. Since the ELECTRIC CRAYON color graphics operating system, EGOS(tm), includes a program loading function (Motorola S1-S9 format), the alarm program could be loaded into and executed from RAM.

Hopefully, this short article shows how easily and inexpensively the ELECTRIC CRAYON can be put to work in useful applications. You have probably thought of a dozen or so already.

ALARM SENSOR PROGRAM FLOW CHART



The ELECTRIC CRAYON [tm]

by Tim McKee

Percom makes a product you may not be aware of, the ELECTRIC CRAYON (tm). Promoted primarily to the TRS-80☆ computer market, the ELECTRIC CRAYON(tm) also has exciting possibilities for the 680X owner. A functional block diagram of the ELECTRIC CRAYON(tm) is shown in the figure below.

The ELECTRIC CRAYON(tm) has its own 6802 microprocessor and therefore is a computer in its own right. The only function of the 6802 MPU is to perform video operations as directed by the input from a parallel port. The 6802 performs its operations on a section of memory that it shares with a 6847 Color Video Display Generator IC, the same color chip that is used in the Radio Shack Color Computer.

The 6847 can generate a display with an X-Y resolution of 256 X 192 pictures elements (pixels) in two sets of two colors, or 128 X 192 pixels in two sets of four colors. Other lower-density graphic modes are available, as are a mixed alphanumeric-semigraphic mode and a full semigraphic mode. The output of the 6847 is conducted to a modulator that produces either composite video or an rf-modulated signal on TV channel 3 (NTSC).

can be connected to a keyboard -- either unencoded or encoded -- and used as an intelligent, programmable color graphics data terminal.

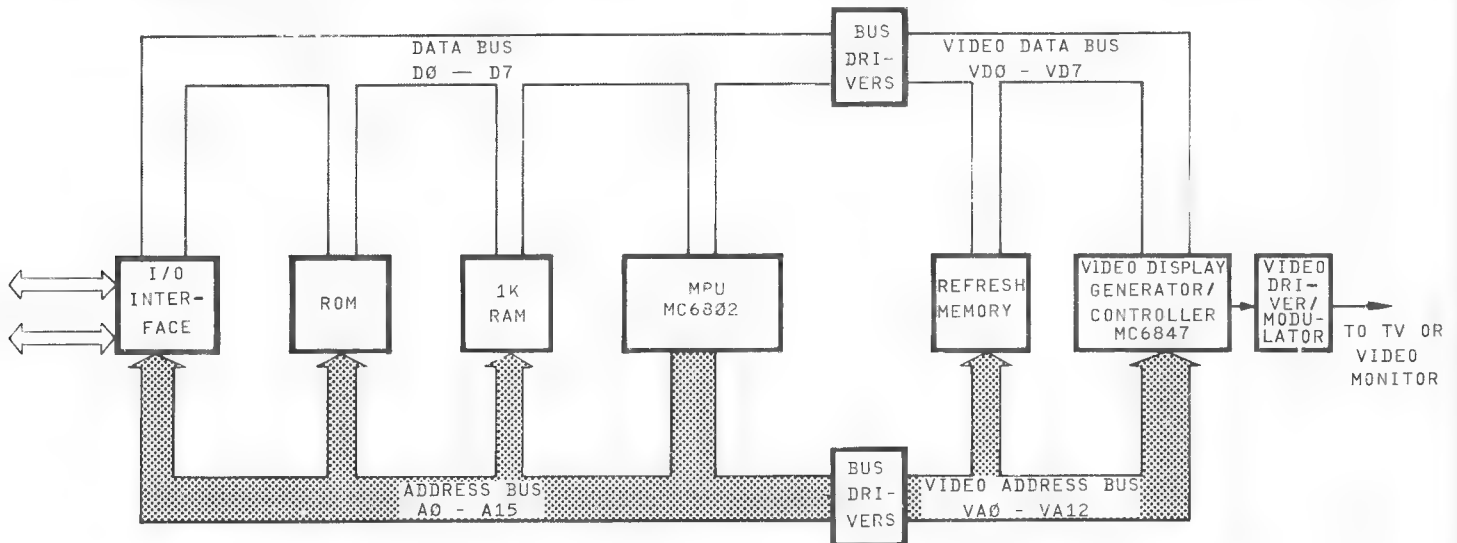
☆ Connecting a keyboard, as mentioned above, the ELECTRIC CRAYON(tm) becomes a low-cost "single-board computer" which can be used for teaching computers in schools. Most computers used for tutorial applications have only two hex LED digits for output; the ELECTRIC CRAYON(tm), however, has a 16 X 32 character display capability.

☆ The ELECTRIC CRAYON can be used in a stand-alone mode, sensing inputs -- from a burglar alarm, for example -- and processing these inputs to initiate a warning response.

The ELECTRIC CRAYON(tm) is now equipped with an improved graphics operating system, EGOS, which is fast and easy to interface to.

EGOS features:

- ☆ Vector table to commonly used routines
- ☆ Automatic look-ahead for extension EPROM



The ELECTRIC CRAYON(tm) has yet to be fully utilized. Most of the TRS-80☆ owners use the ELECTRIC CRAYON(tm) strictly as a color graphics generator. It can do much, much more:

☆ Using the second PIA (peripheral interface adapter), the ELECTRIC CRAYON(tm)

- ☆ Ability to accommodate a second command table
- ☆ Input routine vectoring
- ☆ Interrupt vectoring

The EGOS inherent commands provide the following functions:

Set display mode

- Set display color
- Draw horizontal line
- Draw vertical line
- Set one point
- Erase screen
- Invert colors
- Load a Motorola S1-S9 file

I feel it will take the 680X hobbyist to exploit the full capabilities of the ELECTRIC CRAYON(tm).

Text-to-Speech with SPEAK-2-ME-2 [tm]

by Sam Campbell

The subject of text-to-speech capability using our SPEAK-2-ME-2 comes up at every micro show I attend.

SPEAK-2-ME-2 has no text-to-speech capability -- at least not directly. The program given below, however, generates text-to-

speech. I think of it as a data base, or a word base, that can be used to easily piece sentences together. Although written in Micro Soft BASIC, it can be easily adapted for other BASICs.

Words are stored as data -- using read-data statements -- in an array whose length is set by variable D in line six. Line five sets sentence length and the length of the speech array. When a word is typed, the arrays are checked to see if the word is in the word base; if it is not, an error message is displayed and you can try again.

For example, suppose you enter FOR. It is not in the word base, but FOUR is. Therefore, you could enter FOUR on the retry.

When only one word is to be entered as data, enter the word first and enter a 0 second.

Speak & Spell has about a 3,000-word vocabulary to use as a base. And since our Advanced Speech Driver program can create new words from the Speak & Spell word list, your data base can be extended almost indefinitely. I would suggest entering a base only of commonly used words, since this should be adequate for most purposes.

```

0 REM** PROGRAM IS PROPERTY OF E.(SAM)CAMPBELL.
AND IS OFFERED AS A GIFT. IF MORE THAN ONE WORD
HAS THE SAME SOUND ENTER THE OTHER WORDS AS NEW
LINE. IF ONLY ONE WORD IS ENTERED, PUT A
ZERO(0) AS THE SECOND DATA.
1 CLS:PRINTTAB(20),"TYPE-2-SPEECH-2":CLEAR1000
5 INPUT"ENTER LENGTH OF SENTENCE DESIRED.";N
6 INPUT"ENTER NUMBER OF WORDS TO BE STORED.";D
10 DIM A$(D),B$(D),C$(N),C(N),A(D)
20 FOR ROW=0TOD
'22 READ A(ROW):READ A$(ROW):READ B$(ROW)
25 IF ROW=D GOTO 50 ELSE NEXT ROW
45 CLS:PRINT"WORD ENTERED COULD NOT BE FOUND.
START SENTENCE OVER."
46 FOR T=1TO500:NEXTT:CLS
50 INPUT D$
55 FOR ROW =0 TO D:IF ROW IS >D GOTO 45
58 IF A$(ROW)=D$ OR B$(ROW)=D$ GOTO60
59 NEXT ROW
60 R=R+1
65 C$(R)=D$:C(R)=A(ROW)
66 IF R=N GOTO 100 ELSE GOTO50
100 INPUT"ENTER TO SPEAK";X
101 CLS
110 FOR S=1TO N+1:IF S=N+1GOTO132
111 PRINTC(S),C$(S)
120 Z=USR2(C(S))

```

```

130 NEXTS
132 CLS:PRINT@900,"SAY AGAIN":INPUTX:IF X=1 CLS:
GOTO100
133 CLS:PRINT@900,"ENTER NEW WORDS":INPUTX:
IFX=1 CLS :R=0:GOTO50 ELSE CLS:GOTO1
250 ?INTERNAL WORD LIST 2
255 REM** ENTER DATA WORD HERE ***
260 DATA -29429 :DATA 0,ZERO
270 DATA -1781 :DATA ONE,WON
271 DATA -1781:DATA 1,1

```

Patch for GENERAL LEDGER program

The following patch and procedures were submitted by Gary Davis. Gary designed and wrote our fine General Ledger System for 6800/LFD systems.

The first patch modifies the Charge of Accounts program to correct a bug in the End

of Month program, and the second patch modifies the End of Month program itself. The modification allows the user to run the EOM program without changing the accounting month.

- 1) Load and start Super Basic.
- 2) Remove the Write Protect tab from the ORIGINAL General Ledger disk and insert it in drive 1.
- 3) Type the following :


```

#LOAD 1080
#1612 OPEN #10,F0+2
#1614 FOR F=1 TO 3:FOR J=1 TO 7:PRINT #10,F(F,J):NEXT J:NEXT F
#1616 PRINT #10,L$(1),L$(2),LO
#1618 CLOSE #10
#SAVE 1080
#LOAD 1300
#2035 IF C1=Z1 THEN 2200
#SAVE 1300

```
- 4) When the Drive Activity light turns off, remove the disk from the drive, replace the Write Protect tab, and store the disk.
- 5) Place your CURRENT Master disk in drive 1.
- 6) Type the following :


```

#LOAD 1300
#2035 IF C1=Z1 THEN 2200
#SAVE 1300

```
- 7) When the Drive Activity light turns off, remove the disk from the drive and you are finished with this patch.

SUPER BASIC ADAPTED FOR CMS 9600

The following patches for adapting Super BASIC (ver 2.0) for operation with Creative Micro Systems' 9600 (6802-processor) were provided by Lt. Col. Anthony J. Gasbarre, P.O. Box 70, E. Sullivan, NH 03445. Thank you, Colonel.

0154-0155
015B

F7B6
16

The code at 015B is for SYSMON 1.1 (8 bits, 1 stop bit, - by 64)

ADDRESS
0152-0153

CODE
F81C

Colonel Gasbarre used the following configuration:

Percom PERIPHERAL

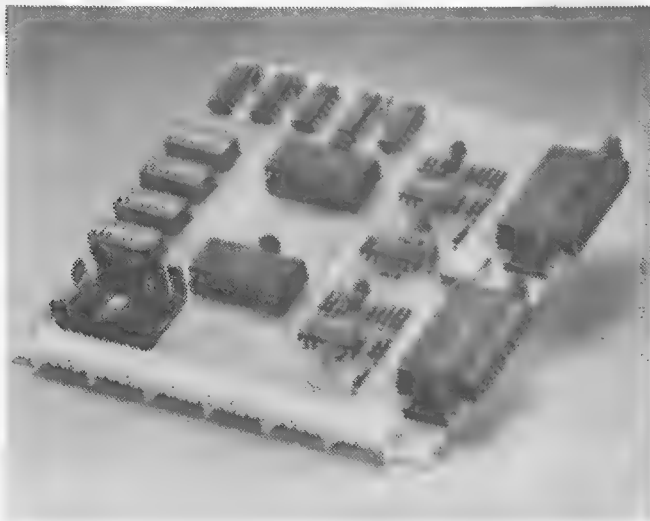
ADDRESS	CHANNEL	TYPE CODE	BASE ADDRESS	TYPE
016D	0	00	0000	-
0170	1	00	E3C0	Control Port (ACIA)
0173	2	00	E3CB	ACIA
0176	3	00	0000	-
0179	4	01	E3D0	PIA
017C	5	01	E3D8	PIA
017F	6	00	0000	-
0182	7	00	0000	-

Colonel Gasbarre made suggestions on ways to clarify the Reconfiguration section of the Super BASIC users manual, and also said he was

entirely satisfied with Super BASIC -- that it was "great".

NEW PRODUCTS

We introduce new products for SYSTEM-50 computers several times a year. Our latest is a dual asynchronous serial communications interface module for the 30-pin bus. This SIO card packs more features per dollar than any we have seen.



Features:

- Available with or without an optional on-card bit-rate generator (BRG). The BRG may be used to produce transmit/receive clock rates, thereby freeing up to five pins on the system bus for other use -- such as extended One Megabyte addressing.
- Compatible with both the older and newer versions of the System-30 bus.
- Design permits control of serial to parallel and parallel to serial data conversion, parity generation and verification, and modem control -- with minimal software overhead.
- Output signals of each channel are current-limited for protection against a short-circuit load.
- Transmit and receive rate of each channel may be individually selected. Moreover, the

transmit rate of a channel may be different from its receive rate. Data rate: 110, 300, 1200, 2400, 4800, 9600, and 19,200 bits/sec.

- Communications signals are compatible with RS-232-C standard levels. Clock signals are TTL compatible.

- Low price: Only \$59.95 without the optional bit-rate generator, only \$74.95 with the BRG components installed. Field upgrade BRG kit is only \$19.95.

Some thumbnail descriptions of other new products are set forth below. These briefs were prepared by Dale French of our technical staff.

M24SS Static RAM Card: A 24K-byte static RAM board organized into three independent 8K byte blocks. Works with either the standard SS-50 bus or the 1 Megabyte extended addressing bus. Comes assembled, burned-in and tested. Users manual includes source listing of diagnostic memory test. Also available in 8- and 16K byte configurations.

M48DSS Dynamic RAM Card: A low power 48K byte dynamic RAM board organized into three independent 16K byte blocks. Works with either the standard SS-50 bus or the 1 Megabyte extended addressing bus. Comes assembled, burned-in and tested. Users manual includes source listing of diagnostic memory test. Also available in 16- and 32K byte versions.

ColorAMA-50: A memory-mapped color VDC board. Generates alphanumerics, semigraphic displays. Full graphic resolutions range from 64 x 64 pixels to 256 x 192 pixels. Displays in two, four or eight colors, depending on the display resolution. Two and four-color displays may be complemented. Board is

designed to accomodate a low cost Radio Shack modulator for TV set display. Comes with one Kbyte of display RAM which provides for alphanumeric, semigraphics and two low-density full graphic display formats. Also provides for 2K byte EPROM. Cassette I/O provides for low-cost file storage. Users manual includes source listing of display OS. Works with 1Megabyte extended addressing bus. The ColoRAMa-50 occupies an 8K byte block of memory in the upper half of a 64K byte address space. Board accomodates additional RAM for higher density display modes.

The COLOR CONNECTION: A cable/circuit card assembly which is used to adapt the 6809-based TRS-80 Color Computer to the SS-50 bus. The COLOR CONNECTION allows access to LFD-400 mini-disk storage, RAM expansion, interfacing (via the ELECTRIC WINDOW, e.g.) to a word-processing quality BW display system, etc.

SS-50 Bus Motherboard: A seven-slot system bus card that can also be used as an extender card for servicing function cards.

SS-30 Bus Motherboard Kit: Accomodates up to eight 30-pin I/O cards. Supplied complete with PC board connectors and components required for application as an I/O extension motherboard for the SS-50 bus.

Since the last Peripheral was issued, many new 680X programs have been released, including MPX/9, a 6809 DOS for our LFD disk systems, and a 6809 version of Percom Super BASIC.

To place an order or request product literature, call our toll-free order number, 1-800-527-1592. For additional technical information call (214) 272-3421.

ED. NOTE

A supplement to this issue of the Peripheral is available from Percom Data Company. The supplement includes more specific information -- for example, additional notes on product improvement and maintenance -- and a 'short-form' product price list. This supplement may be obtained from Percom by calling our toll-free order number, 1-800-527-1592. From within Texas, call [214] 272-3421.

TRADEMARKS APPEARING IN THIS ISSUE:

Percom Data Company, Inc.: ColoRAMa-50, ELECTRIC CRAYON, EGOS, ELECTRIC WINDOW, LFD-400, LFD-800, MPX/9, PSYMON and SBC/9.

Tandy Radio Shack Corp.: TRS-80



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In terms of size, our little HUMBUG is probably one of the smallest things you can add to your system. But in terms of utility, power, and convenience it may well be THE GREATEST!

HUMBUG is a monitor ROM which plugs into your CPU board instead of your present monitor and is a totally compatible replacement. All the standard monitor commands and routines are there, and it will run the same software. But there is more.

HUMBUG is not just a monitor—it is also a complete debugging system. It has additional commands for displaying memory contents in various formats (including ASCII); filling, moving, searching, and checking memory contents; doing memory tests; inserting multiple breakpoints, even single-stepping through programs one instruction at a time. HUMBUG lets you start and stop programs from the keyboard—without pushing RESET. And when a program goes into 'never-never-land', HUMBUG can stop it and tell you where it was when stopped. But there is more.

HUMBUG provides full I/O control from the keyboard. Turn a printer port on and off; enable a user-written port; pause when the screen is full; even turn off your main terminal output and let the program run without being slowed down by output. A printer spooling feature provides a 1K RAM buffer for your printer, and overlaps printing with processing for greater speed. But there is more.

HUMBUG can support your video board. That and a keyboard can replace an expensive terminal, and provide greater speed and versatility as well. Allows simple cursor control, cursor read, and screen read too. But there is more.

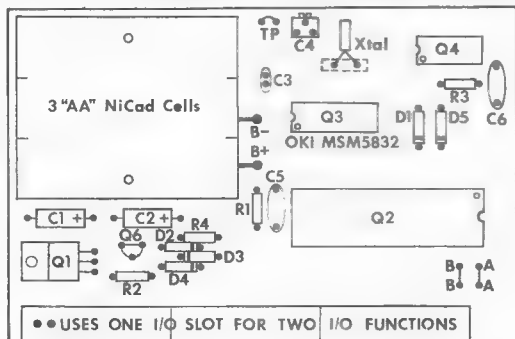
HUMBUG is available for 6800, 6802, and 6809 CPU boards made by SWTP, Gimix, Percom, and Star-Kits. It supports a serial terminal, or video boards made by Percom, Thomas, or F&D. It comes in either 2708 or 2716 EPROMs, and in either 2K, 3K or 4K versions, at prices ranging from \$40 to \$75 which include a full manual and full source code. There are several versions, depending on your hardware configuration, and it's a good idea to get our catalog and HUMBUG spec sheet first. If you want it real fast, call us up any evening with a 300-baud modem and LIST HUMBUG.DAT on our computerized bulletin board. While you're at it, feel free to leave a message for other 68xx users on the system or even place an order.

STAR-KITS

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Model 6800CL4 CalClock/TIMER



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IT'S A HARDWARE CALENDAR/CLOCK

- Keeps date and time without servicing by the computer
- Day-of-week, month/day/year, hour:min:sec (12/24hr. + auto Leap Year)
- Hands off setting/control/access of ALL functions via software
- On-card battery and charging circuit keeps time for months, power off

WITH AN INTERVAL TIMER INCLUDED

- For (TSC/Flex2/9 compatible) printer spooling, multi-tasking, etc.

Fully assembled & tested*	\$ 99.95	5" Disk (Flex2 □ Flex9 □)®	\$ 10.00
Complete kit*	\$ 69.95	Goldplated buss connectors	\$ 6.00
Bare board*	\$ 35.00	Shipping & handling	\$ 3.00

* FULLY DOCUMENTED: instructions; diagrams; theory; more than 20 pages of sample software (automatically puts date in Flex2/9 date buffer, adds time-of-day to assembly listings, maintains constant current time+date display on top line of CRT). Batteries not included. All IC's socketed.

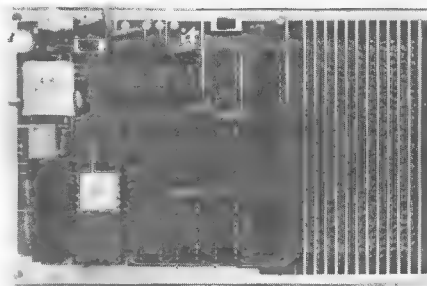
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Flex9 □ Flex2 (default) □



- Supports the 6801 micro-computer family
- Only 4x6 1/2" including a 4x2" prototyping area
- 2K Bytes EPROM/2K Bytes RAM/RS-232 Interface
- Complete documentation (over 50 pages)

MC6801 APPLICATIONS PROTOTYPE BOARD

The APB is a small board which supports the MC6801 family of microcomputers. It is described in Motorola's application note AN799. A typical 6801 member contains an enhanced 6800 processor, 2K bytes of ROM, 128 bytes of RAM, a 16-bit programmable timer, parallel I/O, and a serial communications interface. In addition to the resources of the 6801, the APB provides an additional 2K bytes of EPROM (TMS2716), 2K bytes of RAM (2114L), and a full duplex RS-232 interface. It also supports special versions such as the 6801G1 with its LILbug* monitor; and provides on-board programming of the 68701 EPROM version.

The APB is an excellent educational aid which allows for evaluation and familiarization of 6801 family members . . . It is great for prototype development. Since the 'nuts and bolts' are already in place, the designer need only add the necessary interface circuits for a particular application . . . It can also be used as a simple cost-effective dedicated controller for those limited quantity applications.

Besides being so practical, it is a fun little board. Order yours today!

* TM of Motorola Semiconductor Products, Inc.

APB-1 Bare board with documentation	\$ 19
APB-2 Above assembled with all parts less microcomputer and memory	\$ 69
APB-3 Above with MC6801G1 and LILbug manual	\$ 109
APB-4 Above with four 2114L RAMs	\$ 129

For the SS-30 Bus:

AD-68A A/D Converter - 8 channels, 8 bit, 0-2.5V input, 6ms conversion time — \$39 A&T
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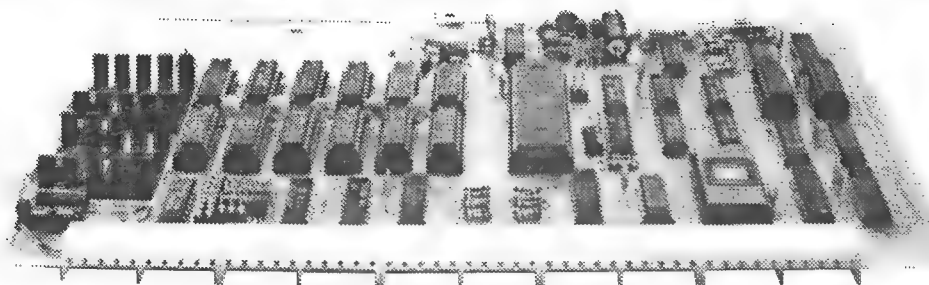
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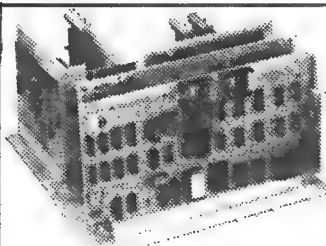
Eleven display formats including 8-color semigraphics, 4-color graphics, 2-color high density graphics and 2-color alphanumerics.

Moreover, two- and four-color displays may be switched between primary and complementary color sets under software control or from the keyboard.

Full graphic resolutions range from 64 x 64 picture elements to 256 x 192 picture elements.

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Low-cost Modulator Option for Color TV Interface: The COLORAMA-50™ provides for installation of an inexpensive RF modulator such as Radio Shack PN 277-122 for operation using a color TV.



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Nobody supports the
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- **Extended Addressing:** The COLORAMA-50™ is compatible with the SS-50A bus and the extended-address SS-50C bus. Map the board into any of the sixteen 64-Kbyte banks of the 1-Mbyte SS-50C address space. The COLORAMA-50™ card "defaults" to the first (lowest) bank for the SS-50A bus.
- **Cassette I/O Option:** Add a few inexpensive components to the on-card circuitry provided and use an audio cassette for program/data storage.
- **Provision for On-Card Firmware:** Put your display operating system, cassette control program, etc. right on the COLORAMA-50™ card in a 2516 (5-volt 2716) EPROM. Resides in the top 2-Kbyte of the card memory space.
- **Operating Software:** Included in the comprehensive users manual is a listing of a display operating system and cassette controller that may be implemented as a callable subroutine function from BASIC or existing operating systems. The programs are optionally available in a plug-in ROM for just \$69.95.

System Requirements

The COLORAMA-50™ is pin- and outline-compatible with the Percom System-50™ bus, the SS-50A (SS-50) bus and the SS-50C bus. The composite video-sync signal output will directly drive a color (or BW) video monitor. The output may be modulated for operation with a standard (NTSC) TV set. A modulator is not included. The COLORAMA-50™ card occupies 8-Kbytes of memory in the upper half of a 64-Kbyte memory space. Included on-card is 1-Kbyte of display RAM which will accommodate alphanumeric displays, semigraphic displays and two low-density full-graphic displays. For the higher density graphic displays, additional display RAM is required. The optional RAM ICs may be installed on the card.

For quality Percom SS-50 bus products, see your nearby authorized Percom dealer. To order direct, call **toll-free, 1-800-527-1592**. Prices and specifications subject to change without notice. Prices do not include shipping and handling.

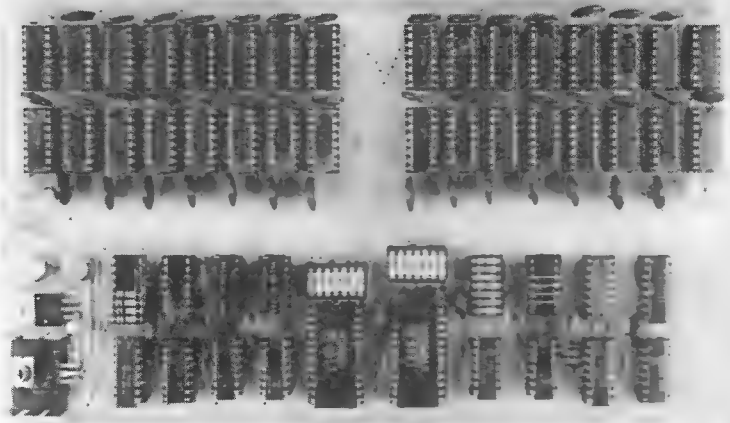
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For The SS-50/SS-50C Bus

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- Compatible with the 20 bit extended addressing mode.
- Diode Protection On The -5V Power Line
- Memory Selection and Relocation For Testing
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- 4116 Type RAM With 200 ns Access Time
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 - Silkscreen Component Layout On Top Side
 - Solder Mask On Bottom Side
 - 9 inches by 5.8 inches
- Designed around Motorola MC3242A and MC3480 Delay Lines To Ensure:
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 - NO [NONE] One-Shots
 - NO Adjustments

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- OPTION 1 - \$80.00 Includes PC Board and 18 Pages of Documentation.
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6809
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STYLOGRAPH 2.0

All of the convenience and features for which Stylograph is well known plus:

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- "Help" command to aid in learning.
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- Can be user configured for virtually any terminal or printer.

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This version is designed for "tty" printers but is otherwise identical to version two. It does not support specialty characteristics such as superscript, subscript, incremental printing, and proportional printing.

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This program takes files of variables, such as names and addresses, and inserts them into a Stylograph text file for automated mail list generation. It will also allow a number of Stylograph text files to be appended at printout time so that page numbers and headings will be continuous in the printout.

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When ordering specify operating system (FLEX™, Uniflex™, or OS-9™) and disk size. VISA & MC accepted. 20% discount on 3 program order.



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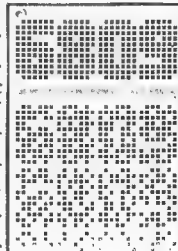
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SS-50 Bookstore

6809 Assembly Language Programming

This book presents a thorough introduction to assembly language programming and a complete discussion of the 6809 instruction set. It starts at a very basic level and builds into actual programming techniques, I/O structures, and hardware interfaces. By Lance Leventhal. 530 pages. Order No. 357

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6809 Microcomputer Programming and Interfacing/Experiments

This book is written to give sound information on how to program and interface the 6809-the high performance 8-bit microprocessor. It contains seven chapters and four appendices and is valuable as a "cookbook" aid when working with the 6809. By Andrew Staugaard, Jr. - 304 pages - Order No. 21798

\$13.95



68000 Microprocessor Handbook

This handbook gives a complete comprehensive picture of the 16 bit 68000 microprocessor, its timing, and special features. Also, several practical application problems are discussed and it is compared to other 16 bit devices. By Adam Osborne - 220 pages. Order No. 411

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MC6809 Cookbook

This cookbook explains the basic operation of the 6809 and the 6809E microprocessors. Everything from the timing and clock information to the instruction set are covered. By Carl D. Warren - Order No. 1209

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—memory changes to program thru full-screen editor	
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(4) 6850 4 serial ports
(1) 6840 3 16 bit counter/timers

which are fully buffered and decoded

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MODEM CARD special parts kit A/T without extra features *SUPER CPU assembled with source listing without 2K EPROMS (2-2708) *Monitor in two 2708 EPROMS *CPU bare card, doc., & src. *VIDEO RAM asm. 7x9 chars 64x16 *VIDEO RAM bare, doc, Xtal, src. *PARALLEL I/O asm 100 I/O lines incl. 5 PIA's for 10 ports *PARALLEL I/O bare card & doc. *SS-50 WIRE-WRAP/PROTOTYPE bare *TRANSITION CARD asm. *TRANSITION CARD bare	B/C \$ 49.00 \$195.00 \$325.00 \$235.00 \$ 29.00 \$ 59.00 \$195.00 \$ 49.00 \$139.00 \$ 49.00 \$ 39.00 \$ 95.00 \$ 49.00	A/T with extra features \$395.00 Software obj. & src. on FLEX disk \$ 10.00 BACKPLANES AND MOTHERBOARDS *16 position SS-50 \$80.00 *12 position SS-50 \$60.00 * 8 position SS-50 \$40.00 * 6 position SS-50 \$30.00 * 4 position SS-50 \$20.00 * 8 position SS-30 \$39.00 **Connectors: GOLD \$1.60 ea. (M or F) TIN M \$.40 ea. F \$.50 ea.
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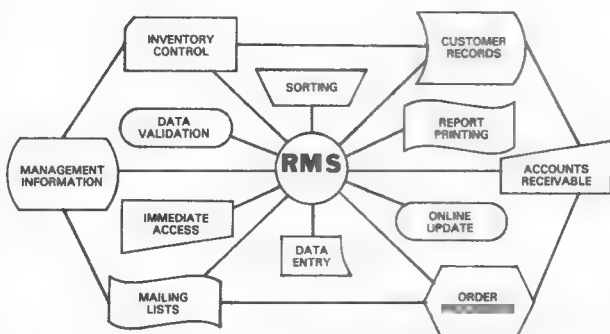
6809

RECORD MANAGEMENT SYSTEM

RMS

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- BUILT-IN SORT/MERGE
- EASY TO USE



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SINGLE CPU LICENSE

FLEX*	\$200
OS-9+	\$250
UNIFLEX*	\$300

TERMS: VISA / MC / PREPAID

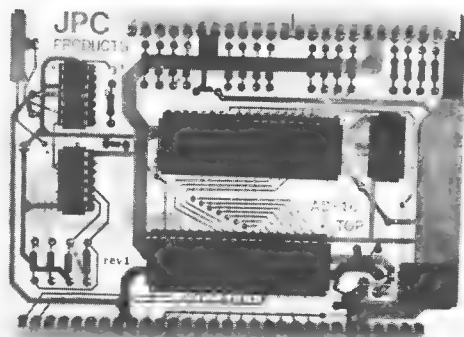
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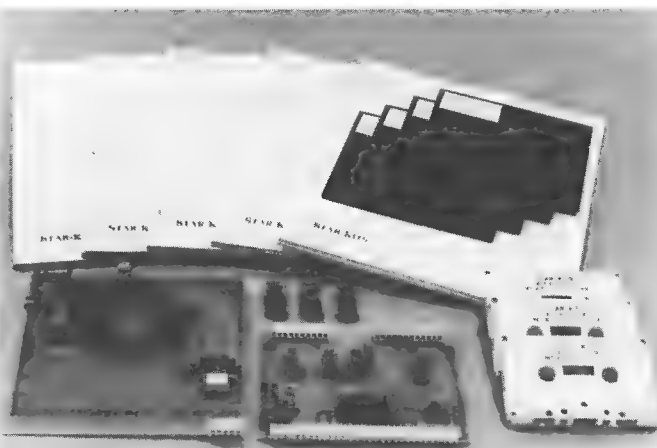
The regular price is \$89.29 with source code and dictionary on disk. BUT...as an introductory special the price is only \$59.29 until November 10, 1981!

STAR-KITS

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STAR-KITS



6800 HARDWARE

SBC-02 single board computer uses 6802 with RAM, ROM, I/O. Ideal controller, intelligent interface, and more. Printed circuit board is \$25, complete controller kit \$75, wired and tested \$150. Also available: HUMB-BUG (see below), Basic in ROM, etc.

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6800 AND 6809 SOFTWARE

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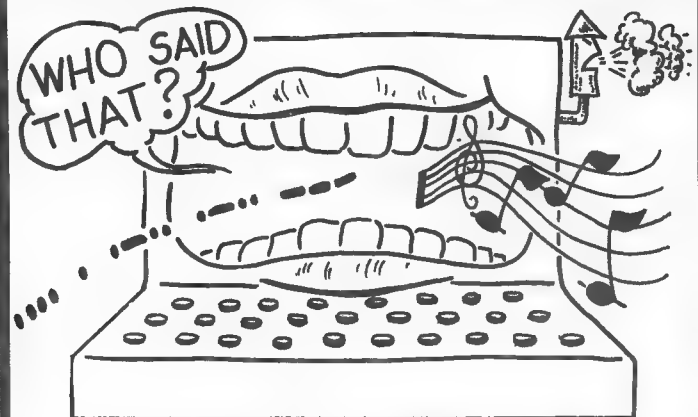
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Chart shows total capacity in Bytes for 2 drives.

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